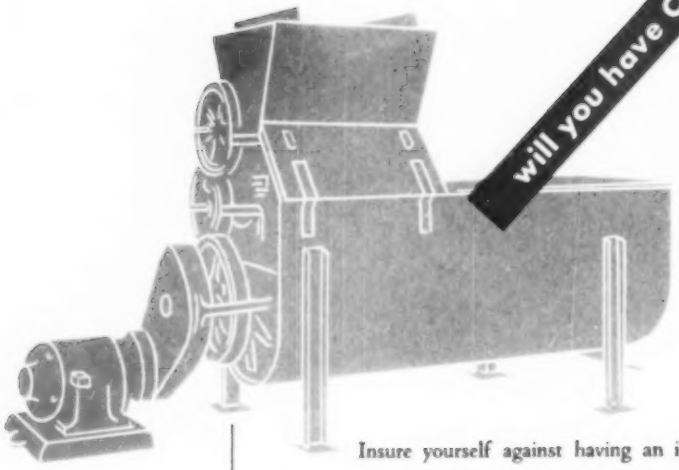
AGRICULTURAL CHEMICALS

will you have CUBE when you need it?



Insure yourself against having an idle mixer due to possible Cube shortages next year. Simply contract with Powell for your future requirements. It's an easy, no-risk way to cross off another worry in these times of uncertain supply. Use the coupon below. It will bring quick action...and assured supply!

2,4-D AND INPC WEED KILLERS
DDT POWDERS AND LIQUIDS
BOTANICALS • ROTENONE • SABADILLA
PYRETHRUM POWDERS AND EXTRACTS
ALLETHRIN
STIMTOX A
CHLORDANE POWDERS AND LIQUIDS
BHC POWDERS AND LIQUIDS
COTTON DUST CONCENTRATES
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ANTU
AEROSOL FORMULATIONS
PYRISCENTS (Insecticide perfumes)
PYRINS
PIPERONYL BUTOXIDE CONCENTRATES
LINDANE

for sure quality and assured supply... look to Powell!

John Powell & Co., Inc.
1 Park Avenue, New York 16, N. Y.

Gentlemen:
Please send me full information on how I can assure myself of adequate supplies of Cube next year.

NAME_____

ADDRESS_____

POWELL

KILLING POWER—THAT'S THE THING!

John Powell & Co., Inc.

ONE PARK AVENUE, NEW YORK 16, N. Y.

Sales Offices: Philadelphia • Pittsburgh • Huntsville • Chicago • Fort Worth • Denver • San Francisco
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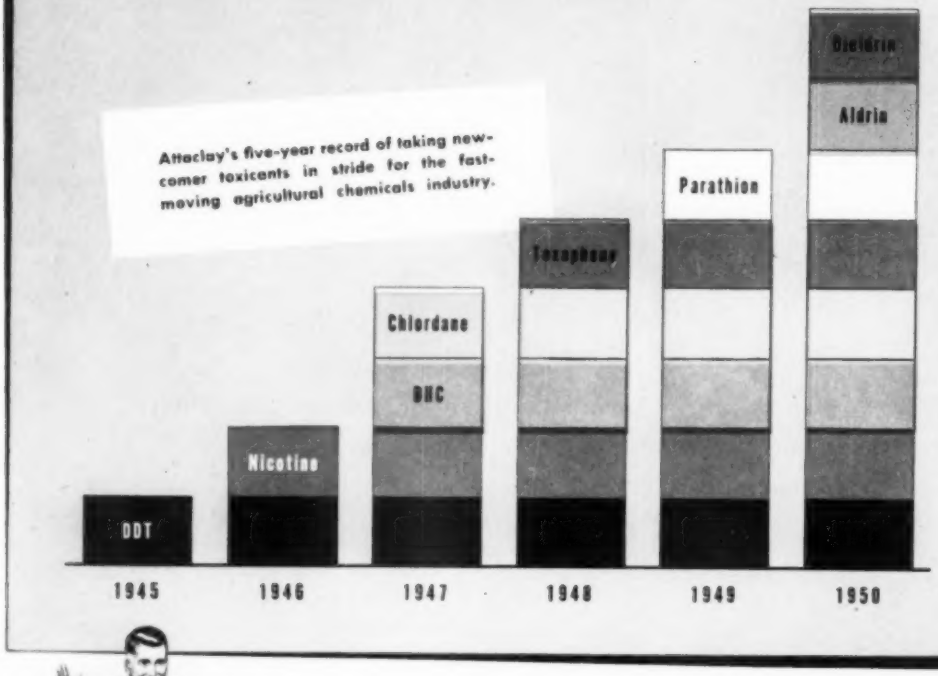
FIVE YEAR PLAN...

ATTACLAY STYLE

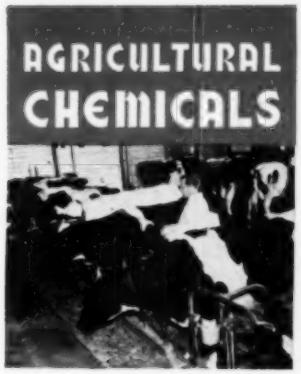


OUR congratulations to all agricultural chemical people for their continuing progress in providing better materials to kill more pests for more growers. Thanks for your votes of confidence in our carrier and diluent—votes cast after tests, comparisons, use. In the chart above, Attaclay gained each bar the meritorious-service way—by delivering top-flight performance to a highly exacting industry.

In the years to come, we'll all succeed best by serving best.

ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Phila. 5, Pa.



THIS MONTH'S COVER

Spraying dairy cattle for control of horse flies and other pests which reduce weight and milk production. Since DDT is not to be used in dairy surroundings, operator applies insecticide with non-toxic residue. (Photo by U. S. Industrial Chemicals, Inc.)

SEPTEMBER 1950

VOL. V No. 9

In This Issue:

A Monthly Magazine For the Trade

•

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AGRICULTURAL CHEMICALS

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Entered as second-class matter November 4, 1949, at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

Here are the startling facts

INCREDIBLE LETHAL POWER!

A few ounces of ALDRIN control boll weevils and grasshoppers on an entire acre!

about ALDRIN

(COMPOUND 118)

2,000,000 POUNDS of ALDRIN* used in 1950 on cotton insects and grasshoppers

Cotton pest control with 4 ounces per acre! Cotton growers are enthusiastic about this powerful new insecticide because of its rapid action and excellent performance against boll weevils, plant bugs, fleahoppers and thrips. All these pests are controlled with a 4-ounce per acre dosage in either dust or spray form.

Grasshopper control with 2 ounces per acre! The three Canadian Prairie Provinces—Alberta, Saskatchewan and Manitoba—used 500,000 pounds of Aldrin in 1950 to combat a very bad grasshopper infestation. Aldrin was the only "hopper stopper" used and excellent control was obtained with a spray containing but 2 ounces per acre. *That's 8 acres of dead grasshoppers per pound of Aldrin!*

Compatible with farm chemicals! Aldrin is entirely compatible with all commonly used insecticides and fungicides. It is the only chlorinated hydrocarbon insecticide that is stable in the presence of strong alkalis. Aldrin does not lose its power on whitewashed surfaces or in lime mixtures.

Plan 1951 Aldrin formulations now! Mail the coupon today for complete details. **Shell Chemical Corporation** is the exclusive national distributor of unformulated Aldrin and Dieldrin which are manufactured by **Julius Hyman & Company.**

*3,400,000 pounds of 60% Aldrin Equivalent Solution.

TECHNICAL GRADE ALDRIN AND DIELDRIN WILL SOON BE AVAILABLE

SHELL CHEMICAL CORPORATION
Please send all available data on Aldrin.
Name_____
Position or Title_____
Company_____
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City_____ State_____

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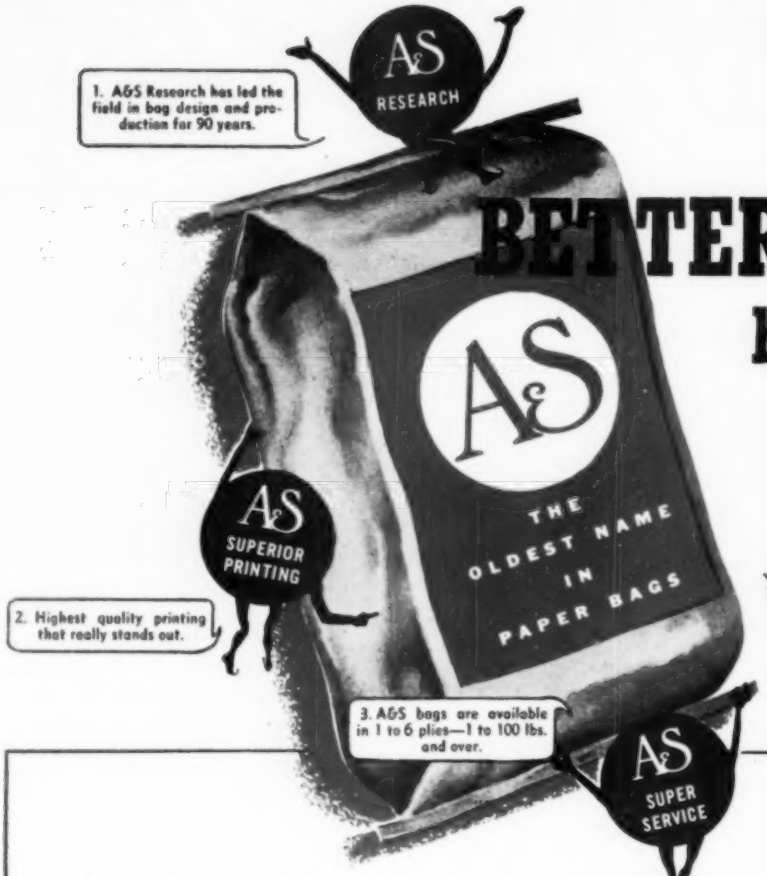

RECENT DEVELOPMENTS FROM THE A & S PACKAGING LABORATORY

Expendable Pallets — Palletized shipments of A&S bags lower your handling costs, minimize storage space.

STA-STAK Bag—Creped outer wall takes skid and slip out of stacking. Greater resiliency, easier handling.

SHUR-CLOSE—Ingenious bag valve assures less dust when packing—less sifting when packed —prevents waste.

PLASTO-PAK Bags—Polyethylene lined, moisture-proof protection for hygroscopic materials with exclusive "Electro-Seal" bottom closure.

SUPER GLOSS Flour Bag—Toughest of flour bags is bright white with brilliant inks to provide sparkling, appealing shelf packages.

ARK-TONE Printing—Sharp, clear color process combines perfect reproduction and brightness for consumer packages.

HI-TONE Printing—Strong, deep colors for sugar, salt, rice and similar bags.

PRESSUR-PAK Bale — Bags are packed under pressure. Saves 50% of customers' space allotted to storage.

ARKELL and SMITHS

CANAJOHARIE, N. Y. • WELLSBURG, W. VA. • MOBILE, ALA.

ARKELL & SMITHS 90 YEARS OF KNOW HOW THE OLDEST NAME IN PAPER BAGS

MONSANTO 2,4-D
ousts sagebrush and fields produce more beef

Take a sagebrush-infested field large enough to pasture one steer . . . remove the brush with Monsanto 2,4-D to give the grass a chance . . . and you'll develop pasture for *two* steers. Not only that, but each animal on the brush-free ground will show greater gain. These facts mean profits for formulators of herbicides.

Cattlemen are well aware of the importance of cleaning out sagebrush. They'll buy sprays to kill it. Stock your dealers in the sagebrush areas with formulations of Monsanto 2,4-D and you profit . . . your dealers profit . . . cattlemen profit.

Monsanto can make immediate shipments of 2,4-D in 100-pound fiber drums. It is a fine white powder, assaying approximately 99.0% and having a melting point of 138.0° C. min.

In correct formulations, Monsanto 2,4-D is effective against sagebrush, and a wide number of other woody plants. For further information mail the coupon or contact the nearest Monsanto Sales Office. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1766-J South Second Street, St. Louis 4, Missouri.

MONSANTO HERBICIDAL CHEMICALS

2,4-D ACID
2,4-D SODIUM SALT
2,4-D ISOPROPYL ESTER
2,4,5-T ACID
2,4,5-T ISOPROPYL ESTER
SANTOBRITE® (Sodium Pentachlorophenate, Tech.)
SANTOPHEN® 20 (Pentachlorophenol, Tech.)

MONSANTO INSECTICIDAL CHEMICALS

SANTOBANE® (DDT)
SANTOCHLOR® (para-Dichlorobenzene)
SANTOPHEN 20 (Pentachlorophenol, Tech.)
TRICHLOROBENZENE, Technical
NIFOS®-T (Tetraethyl Pyrophosphate, Tech. For agricultural use only)
NIRAN® (Parathion. For agricultural use only)

®Reg. U. S. Pat. Off.

MAIL COUPON FOR DATA *on Monsanto Emulsifiers and Wetting Agents. Ask for* NEW *Technical Bulletin P-142.*

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SERVING INDUSTRY . . . WHICH SERVES MANKIND

Now in greater demand than ever before—

Compare all the advantages of PENCO BHC TECHNICAL-36. Then you'll see why this exclusive Pennsalt product is preferred by formulators everywhere!

EASY TO USE You can melt it and apply it to the diluent with ease. PENCO BHC TECHNICAL-36 is a waxy solid with low melting range. You can use it for either liquid or dry formulations.

BETTER IN FORMULATION Enables you to give your customers a finished product containing *more* of the gamma isomer, *less* of the other isomers of BHC.

SAVES MONEY 3 WAYS Lower freight charges . . . less storage space . . . less time and effort spent in handling! Alone among BHCs, Pennsalt's has 36% gamma content . . . 3 times as concentrated as most Benzene Hexachlorides.

PROVED IN ACTUAL USE Formulators and compounders all over the country are ordering and re-ordering this product. In fact, Pennsalt is greatly increasing its production facilities to meet the ever-mounting repeat demand.

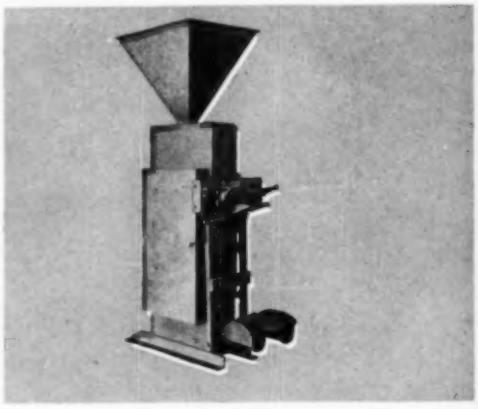
MADE FOR THE JOB Pennsalt manufactures chemicals right from the ground up . . . makes them "just right" for their specific jobs.

For further information write to: Agricultural Chemicals Department, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.; Tacoma, Washington; Bryan, Texas; Portland, Oregon; Los Angeles, Calif.

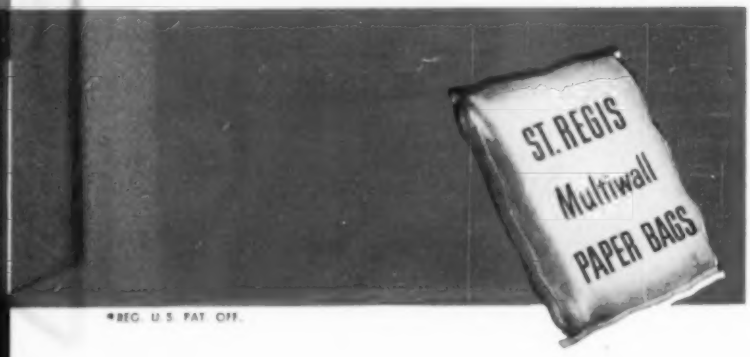
PENN SALT *agricultural chemicals*

PROGRESSIVE CHEMISTRY FOR A CENTURY

PACKS UP TO 24 TONS PER HOUR!



A NEW ST. REGIS* BAG-FILLING MACHINE FOR THE SMALLER FERTILIZER PLANT



*REG. U. S. PAT. OFF.

▶ Here's the fertilizer packer you've wanted! An efficient, low-cost filling machine that packs 18 to 24 tons per hour, yet requires *only one operator* . . . the new St. Regis 325-PB.

▶ This dependable packer is designed, engineered and priced for the smaller plant, where volume does not warrant a machine of great capacity. It incorporates many of the outstanding features of the well known, larger-capacity 160-FB. Used in packing strong St. Regis Multiwall Paper Bags—it provides a packaging set-up that's certain to cut your production costs.

▶ *For complete details on the new, 325-PB filling machine, and ways it can help you, get in touch with your nearest St. Regis Sales Office.*

SALES SUBSIDIARY OF ST. REGIS PAPER COMPANY

ST. REGIS

SALES CORPORATION

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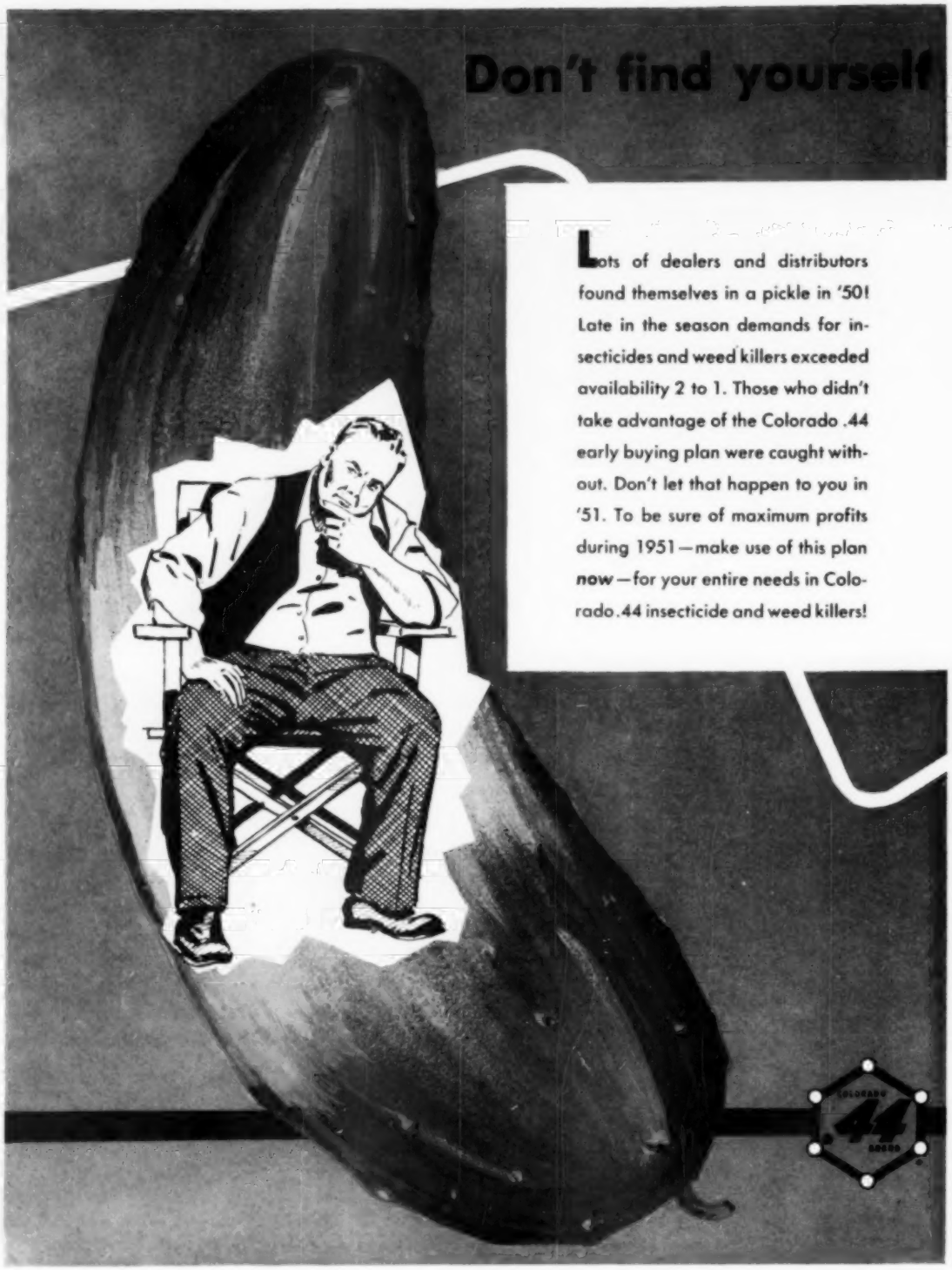
YOU BUY PROTECTION WHEN YOU BUY MULTIWALLS

TURN THE PAGE

FOR MORE COLORADO .44 ADVERTISING NEWS . . .


Don't find yourself
Lots of dealers and distributors found themselves in a pickle in '50! Late in the season demands for insecticides and weed killers exceeded availability 2 to 1. Those who didn't take advantage of the Colorado .44 early buying plan were caught without. Don't let that happen to you in '51. To be sure of maximum profits during 1951—make use of this plan *now*—for your entire needs in Colorado .44 insecticide and weed killers!
COLORADO
44

in a Pickle in '51!

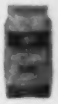
ORDER SOON—TO BE SURE OF AN ADEQUATE SUPPLY LATER ON!

Colorado .44 Toxaphene

Colorado .44 Chlordane

Colorado .44 Aldrin

Colorado .44 2,4,-D, 2,4,5-T in Amine, Butyl Ester and Isopropyl Ester Forms.



Colorado .44 DDT

HOW COLORADO .44 CAN HELP YOU EARN MORE PROFITS DURING 1951

1. LONG-RANGE ADVERTISING PROGRAM. Advertising in national publications, dealer tie-ins, displays, decals and other dealer helps let people know that you're the one who handles Colorado .44!
2. PRICE PROTECTION. Prices quoted on Colorado .44 will be adjusted to meet regular market prices during the selling season.
3. CONVENIENT TERMS. Take 60, 90 or 120 days to pay—according to your needs.
4. HIGHEST QUALITY. Colorado .44 Insecticides and weed killers are made with the finest ingredients to uniform formulations. Insure top results. Make more than ever before with Colorado .44.

Sizeable amounts of Colorado .44 BHC now available

write, wire or phone for information on all Colorado 44 products

CHEMICAL CORP. OF COLO.

1600 West 12th Ave. Denver 4, Colorado

Chemical Corporation of Colorado
1600 West 12th Ave.
Denver 4, Colorado

Rush information on all Colorado .44 products and the Colorado .44 Early Buying Plan.

Name_____

Address_____

City_____ State_____

SHARPLY REDUCES COSTLY BREAKAGE—

CHASE sharkraft

Built to **TAKE** *it!*

THE ALL-CRINKLED MULTIWALL BAG

Breakage is costly in many ways . . . to you, to your customers! All plies of Chase SHARKRAFT are crinkled to give "shock-absorbing" elasticity, assuring much greater resistance to breakage! The "shark-skin" crinkling of SHARKRAFT provides a sure grip—makes for easier handling and better stacking qualities. Available in choice of 2 to 5 plies. Furthermore, you'll find that the sharp, colorful printing and the attractive appearance of SHARKRAFT bags help stimulate the sale and acceptance of your product. Get the facts on this better container . . . Chase SHARKRAFT . . . mail coupon TODAY!

THE IDEAL CONTAINER FOR

- Farm Products
- Powdered Milk
- Mineral Concentrates
- Seeds • Chemicals
- Pharmaceuticals
- Fertilizers
- Rock Products
- Meat Scraps and Tankage
- Starch Products

SINCE 1847

CHASE BAG COMPANY
309 West Jackson Boulevard
Chicago 6, Illinois

Gentlemen: Please send me more information about SHARKRAFT bags for the packaging of: .....

☐ Have Salesman Call

Name.....

Address.....

City.....State.....

CHASE BAG CO. GENERAL SALES OFFICES: 309 W. JACKSON BLVD., CHICAGO 6, ILL.

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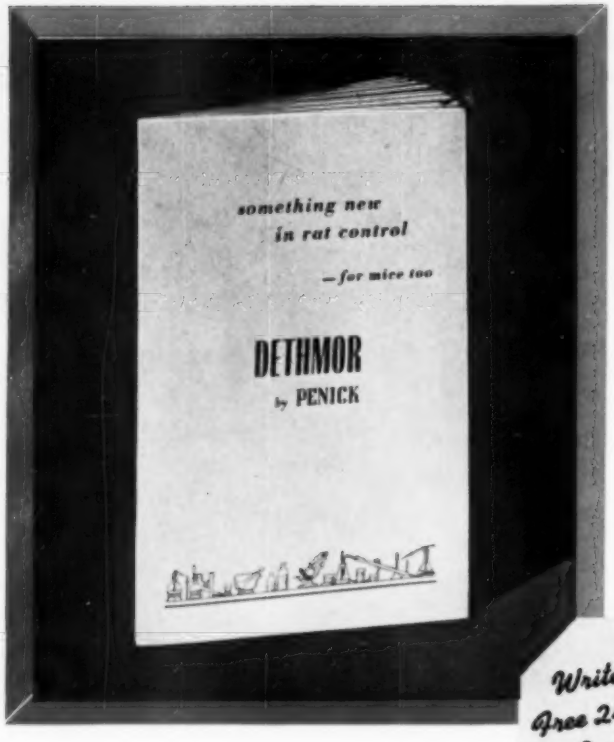


Write for Free 24 Page Booklet

DETHMOR treatment is a *continuous control procedure* quite different from methods heretofore standard or customary.

DETHMOR feeds rats and mice minute doses of an anti-blood coagulating chemical over a five, ten or fifteen day period — doses so small that hazards to humans or household pets are almost negligible. Of course, since it is a rodenticide, care is necessary when using, and our label gives valid cautions.

DETHMOR baits are acceptable to rats and mice from start to finish; no bait shyness develops!

DETHMOR is formulated from warfarin under precise laboratory control. Mix 19 parts bait with 1 part Dethmor, and 85% to 90% control may be expected.

S. B. PENICK & COMPANY

50 CHURCH STREET, NEW YORK 7, N. Y.
Telephone, COrtlandt 7-1970

735 WEST DIVISION STREET, CHICAGO 10, ILL.
Telephone, MOHawk 5651

SIFT PROOF MOISTURE PROOF TOUGH AS A PIG'S NOSE!

Fulton W. P. P. L. bags cost less than rigid containers, save on storage space, reduce cost of handling and shipping. Made from durable, tough burlap or cotton material laminated with waterproof adhesive to a special, crinkled Kraft paper lining. Positively sift proof and moisture proof, and much stronger than unlined textile bags. **Fulton** W.P.P.L. bags (waterproof paper lined) are ideal containers for export and domestic shipments of hygroscopic materials, lawn and garden mixtures and other special fertilizers.

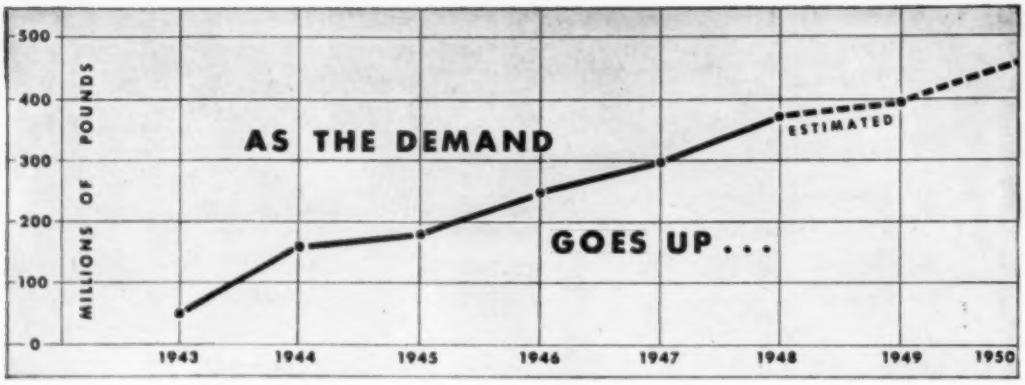
Investigate the advantages of these modern containers for your product. Write the Fulton branch nearest you.

NATIONALLY RECOGNIZED QUALITY

The high quality of Fulton Multiwall paper bags has won broad recognition from the largest users in many industries, who have favored us with orders. Our new modern plant in New Orleans is producing all types of Multiwalls. Give us a call on your next order.

Fulton BAG & COTTON MILLS

Atlanta • New Orleans • Dallas • St. Louis • Kansas City, Kans. Minneapolis • Denver • Los Angeles • New York, 434 Broadway



ANTARA® announces new low prices on NON-IONIC SURFACTANTS

Antarox A-200, A-201, A-400, A-401, A-402, A-403, A-404, A-480

Alkyl aryl polyoxy ethylene glycols

. . . in a complete series with varying properties and degrees of water-solubility—and from clear liquids to pastes and waxes

Steadily the demand increases—as industry after industry finds new and wider uses for surfactants. This young industry has already surpassed synthetic rubber in its tonnage!

The *non-ionic* surfactants are in particular demand by the makers of cleansers of every type—for the home, commerce and industry—insecticides, cosmetics, metal cleaning compounds, oils, waxes and other products.

In keeping with this trend, Antara announces new low prices—reductions of 13% to 15%—on the A-200 and A-400 Series of non-ionic surfactants. Such reductions mean that these superior agents are now priced for use by many additional compounders.

We invite your inquiry for Data Sheets and the new prices. Extensive research staffs and facilities support the development and application of all Antara Surfactants—available to work with you in the improvement of an existing product or the development of a new one. Your inquiry is invited—without obligation. It will bring a prompt opinion as to whether one of the Antara Surfactants may be adaptable to your needs. Kindly address your inquiry to Department 40.

APPLICATIONS

Antara offers a series of emulsifiers and emulsifier combinations for the formulation of DDT, Chlordane, Toxaphene, Lindane, Aldrin, Pyrenone, Parathion, 2,4-D ester, and dormant oil emulsifiable concentrates. Depending on the degree of stability desired, solvent used, water hardness, and so on, we may be able to recommend the right agent or combination of agents for your purpose.

ANTARA® PRODUCTS

SURFACTANTS . . . CARBONYL IRON POWDERS

GENERAL ANILINE & FILM CORPORATION

444 MADISON AVENUE, NEW YORK 22, NEW YORK

1639 POPLAR STREET, OAKLAND 7, CALIFORNIA

In Canada: CHEMICAL DEVELOPMENTS OF CANADA LIMITED, LEASIDE, TORONTO 17

EFFECTIVENESS OF NEW PARATHION INSECTICIDES ESTABLISHED BY INTENSIVE RESEARCH

The high degree of protection afforded by THIOPHOS® Parathion against most insects attacking fruit and vegetable crops has been established by the three-year research program behind the development of this modern insecticide ingredient.

Participating in the program were state and national agricultural experts, and while the success of parathion on many crops has been firmly established, the program continues to uncover the ability of parathion insecticides to protect many others.

It has been definitely established that, when used according to directions, insecticides containing parathion give outstanding protection against most insects and mites attacking such fruits as apples, grapes, peaches, pears, prunes and plums, strawberries and walnuts. And on vegetables, it kills most insects common to beans, cabbage, celery, corn, cucumbers, squash, peas, peppers, tomatoes, potatoes and most root vegetables.

Be sure to consult your local agricultural authorities on your own insect problems.

PEACHES PROTECTED throughout their growth by THIOPHOS Parathion insecticides show lush foliage, no insect damage.

Thiophos Parathion Insecticides made by National Manufacturers

Insecticides made from THIOPHOS Parathion are available in dust and wettable-powder formulations from reputable manufacturers.

Weather, Timing, Method of Application Important Factors In Successful Use of Parathion

To profit fully from the efficiency of parathion as a pest killer, farmers and fruit growers are being urged by Federal and State agricultural experts to observe carefully the manufacturers' instructions for applying parathion to specific crops. Such factors as weather, timing in relation to the development of the crop and insects, and method of application are known to be just as important as the correct dosage in achieving best results. For this reason, users are advised to consult with local agricultural experts or manufacturers' representatives to be sure of getting the most complete pest control and crop protection with this remarkable insecticide.

Use Parathion Safely

Any insecticide toxic to insects is also hazardous to humans if used carelessly and in defiance of certain common-sense precautions.

These precautions are stated explicitly on every container of parathion insecticides. They must be read carefully and observed strictly to avoid accidents.

It is urged that work crews who are given parathion to apply be fully advised also of the necessity of observing these precautions.

Be sure to write for Grower's Manual on Parathion

AMERICAN Cyanamid COMPANY

Agricultural Chemicals Division

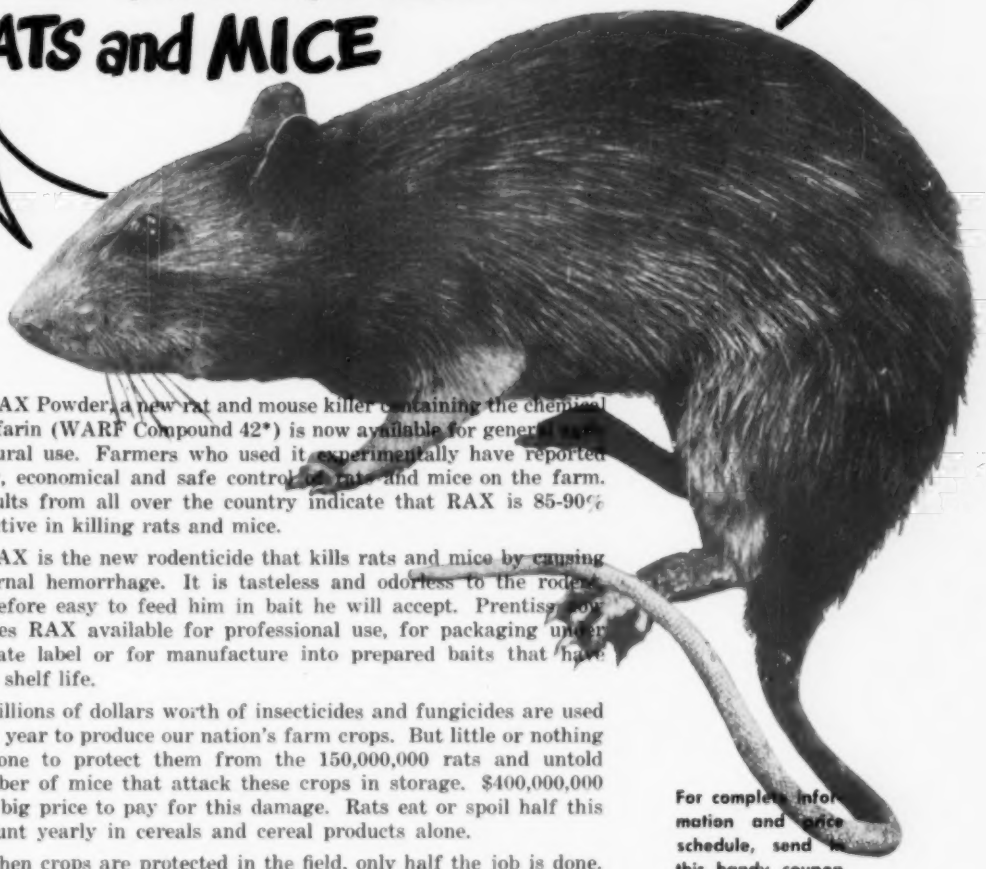
32-D ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Please send me Growers' Manual giving latest recommendations for using Parathion.

Name_____

Address_____

WHAT IS Rax?...BROTHER IT'S MURDER TO US RATS and MICE



RAX Powder, a new rat and mouse killer containing the chemical warfarin (WARF Compound 42*) is now available for general agricultural use. Farmers who used it experimentally have reported easy, economical and safe control of rats and mice on the farm. Results from all over the country indicate that RAX is 85-90% effective in killing rats and mice.

RAX is the new rodenticide that kills rats and mice by causing internal hemorrhage. It is tasteless and odorless to the rodent, therefore easy to feed him in bait he will accept. Prentiss now makes RAX available for professional use, for packaging under private label or for manufacture into prepared baits that have a long shelf life.

Millions of dollars worth of insecticides and fungicides are used each year to produce our nation's farm crops. But little or nothing is done to protect them from the 150,000,000 rats and untold number of mice that attack these crops in storage. $400,000,000 is a big price to pay for this damage. Rats eat or spoil half this amount yearly in cereals and cereal products alone.

When crops are protected in the field, only half the job is done. It's just as important for the farmer to protect his crops in storage as it is to protect them in the field.

*Distributed under U. S. Patent No. 2,427,578

For complete information and price schedule, send in this handy coupon today:

R. J. PRENTISS & CO., Inc.

110 WILLIAM ST., NEW YORK 7, N. Y.

9 SO. CLINTON ST., CHICAGO 6, ILL.

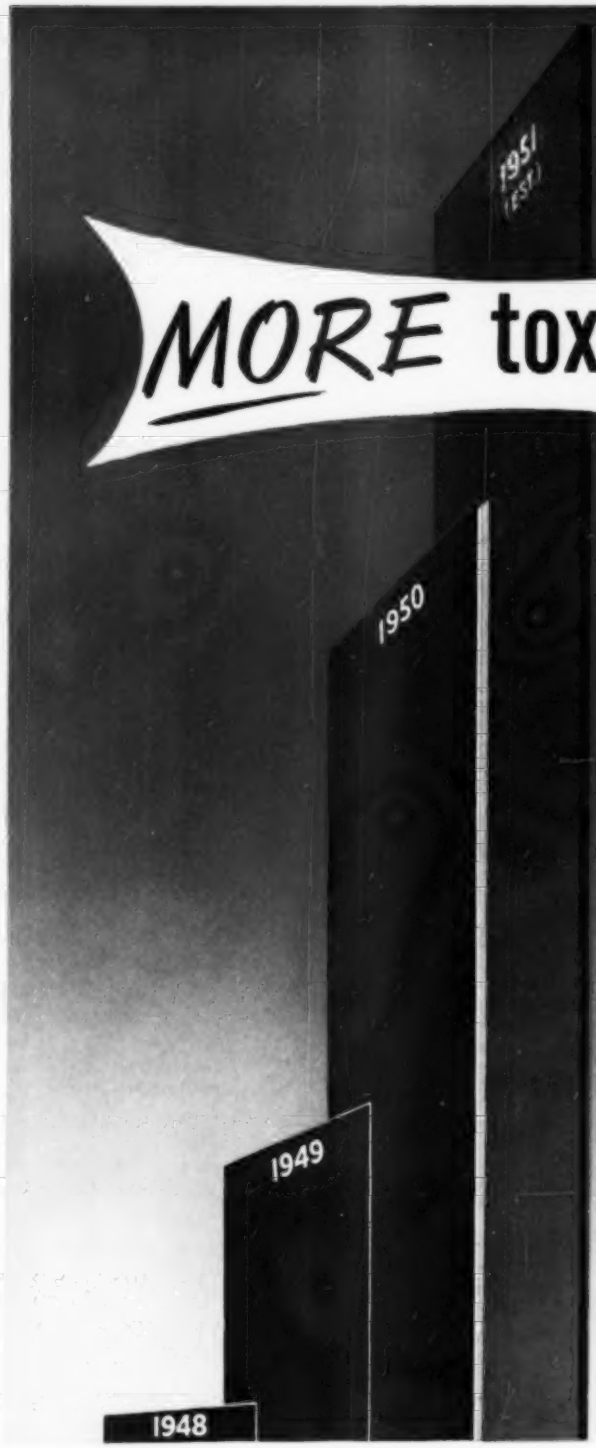
I am interested in RAX for ☐ professional use ☐ repackaging under private label ☐ repackaging with prepared baits. Please send full information and prices.

Name .....

Company .....

Address .....

City ..... Zone ..... State .....



MORE toxaphene

During the first six months of 1950, Hercules made available to processors almost three times as much technical toxaphene as was supplied during the same period of 1949. This expansion had to be planned and started in the early part of 1949. This record quantity of toxaphene in 1950 was more than twenty times the amount produced in the first half of 1948.

Anticipating still greater demands next year, Hercules already has started construction of another toxaphene plant—at Hattiesburg, Mississippi. This plant is expected to be operating by February, 1951, and should mean almost 50% more technical toxaphene next year.

HERCULES POWDER COMPANY
970 Market Street, Wilmington, Delaware

NX50-74

THE EDITOR COMMENTS

VALUABLE lessons learned during the hectic days of World War II should help the fertilizer manufacturing industry so far as "know-how" is concerned if history repeats itself in a third world war. It adds up to the fact that the industry will be in a far better position to supply plant food to the nation than it was when Word War II began.

As the National Fertilizer Association points out, editorially, "The great expansion in productive capacity for materials and mixed fertilizers that has been achieved during the past ten years, plus the knowledge and experience gained during this period should go far toward preventing a recurrence of some unsatisfactory conditions that existed from 1941 through 1945. Since 1941, fertilizer plants have been expanded and modernized, and new plants have been built in strategic locations across the country.

The Association continues in its *Fertilizer News*: "To these factors should be added those extremely important attributes that enabled our industry to achieve an uninterrupted increase in output through the war period despite scarcities and unfavorable priority ratings for labor and facilities." These qualities included skill, enterprise and unquestioned devotion; each of which contributed greatly to the over all achievement.

We hope, of course, that world war III will be stalled for good . . . but if it does come, it will find the fertilizer industry ready to do its job even more adequately than it did during the record-breaking production of the war.

Meanwhile, current predictions are that fertilizer sales for 1950 are heading for another record. Following an unusually active spring season, demand for fertilizer materials during the summer was strong in anticipation of heavy fertilizer buying in the year ahead. Supplies of raw materials appear adequate, a survey indicates, although some of the necessities are sold well ahead. Potash supplies, for instance, now appear in good shape despite the recent strike. Barring further labor trouble, supply should be adequate.

However, all of these predictions are qualified with a big "if." *If* the tense international situation gets no worse; *if* allocation of nitrates does not take away much of the industry's supplies and *if* the Federal Government allows private industry to function as it can . . . we see good days ahead. At least, the responsibility for supplying plant food to agriculture is in the hands of an industry which has proved itself before!

ALTHOUGH there is some tendency in the trade to feel relieved at the Government's announcement that there will be no temporary agencies set up to handle economic controls in the current international crisis, the prospect may not be as happy as it appears on the surface. True, not many want to see the return of OPA, WPB, etc., but when control is placed in the hands of existing federal departments, when and where will their life-and-death authority end? The feeling in Washington, and among top business people, is that once this type of legislation is passed, it could endure a long, long time.

These are not temporary agencies as in World War II to be disbanded when the emergency is over. They are solidly-established adjuncts of the government, the Department of Agriculture for allocations of food and agricultural products, the Department of Commerce for allocations of strategic materials, and the Department of Labor for man-power allocations. How far and how long Government controls will continue remains a matter of conjecture, but some of the most level-headed leaders in industry are predicting a minimum of ten years, with the possibility of a longer indefinite period.

This latest development in Washington has brought some deeply serious thoughts to the minds of many business men. Are we, ourselves, while we fight communism in foreign lands with the lives of our sons on the one hand, falling into the very trap which put communism in the saddle in Europe,—the creation of an all-powerful central government dictating every daily detail in the lives of its people?

Use of Glyoxalidine Derivatives as

Fruit Fungicides

FROM the beginning, the use of chemical fungicides as sprays for the protection of the country's major fruit crops has been attended by varying degrees of injury to the fruit and foliage to which such sprays are applied for protection. The choice of fungicides as well as of methods of applying these has always involved an attempt to balance satisfactory control against minimum injury. Such balance is difficult to attain since the very properties of a fungicide which are responsible for its high fungicidal efficiency are apt to be the same properties that, under some conditions at least, may produce injury. The widespread recognition of the injury factors inherent in the older standard fungicides such as "bordeaux mixture" and lime-sulphur and the demand for safer materials has been one of the biggest factors during the past 20 years in stimulating the search for new fungicides.

The effectiveness of certain glyoxalidine derivatives, as foliage fungicides was brought to the attention of the public by Wellman & McCallan (7) and by Thurston et al. (6) in 1946. Of the numerous possible derivatives based on the glyoxalidine nucleus, three were reported as being of special promise as foliage fungicides, namely: 2-Heptadecyl glyoxalidine, 1-Hydroxyethyl- 2-heptadecyl-glyoxalidine, and 1-aminoethyl-2- heptadecyl glyoxalidine.

The maximum fungistatic action was reported as occurring with derivatives bearing a straight chain substituent containing 13 to 17 carbon atoms in the 2-position. Evidence was presented that these materials were much more active in inhibiting the germination of fungus spores than in actually killing them, and also that the typical toxicity curve has a very steep slope, which is influenced but little by temperature or length of the infection period. Phytotoxicity studies in the greenhouse indicated a wide margin of safety on some plants and a definite injury at fungicidal dosages on other plants, pointing to the probability that the glyoxalidines would find definite special purpose uses.

Field tests with glyoxalidine derivatives as apple sprays were initiated in 1942, (See Table 1.) on farms of the Pennsylvania State College, and tests have been continued there through 1949. Tests on sour cherries were begun in 1942 in Pennsylvania and in the states of Virginia and West Virginia. (See Table 2.) Thurston et al. (6) have published in some detail the results of the first five years of such tests. Groves, Miller & Taylor (2) and also Lewis & Groves (4) have reported on the value of glyoxalidine in the control of leaf spot (*Coccomyces hiemalis* Higgins) on sour cherry.

In brief, the results of these early field tests indicated: (1) that glyoxalidine could be depended upon to control apple scab in a preventive schedule as well as or better than standard fungicides in common use, and that it also produced better appearing foliage with a greater leaf area per fruit spur than a standard sulfur spray schedule. (2) That glyoxalidine in four year tests in Pennsylvania and Virginia and two years in West Virginia, was the most effective material tested for the control of leaf spot defoliation and that control was accomplished with little or no leaf injury and without dwarfing the fruit.

Since 1946 field testing of glyoxalidine under the trade names "Crag 341C" and "Cherry Fungicide 341B" has continued in most of the principal apple and cherry growing sections of the United States and Canada, and also Great Britain.

An abstract of tabular data from all states reporting in detail to the committee where Crag 341C was included in the respective tests. Illinois—Data of Dwight Powell; Maine—M.T. Hilborn; New Jersey—R. H. Davies; North Carolina—C. N. Clayton; Ohio—H. C. Young and H. F. Winter: West Virginia—C. F.

TABLE 1

First Field results on Control of Apple Scab by three glyoxalidine derivatives.

Treatment	Percent Scabby Fruit At Harvest			
	1942		1943	
	Stayman	McIntosh	Stayman	McIntosh
Check (Unsprayed)	100	99.6	78	99
2-Heptadecyl glyoxalidine 1.5-100	2	1.7	—	—
1-Aminoethyl-2-heptadecyl glyoxalidine 3-100	1.6	1.7	—	—
1-Hydroxyethyl-2-heptadecyl glyoxalidine 1-100	—	—	2.1	3.0
Lime Sulphur 1-75	2.1	3.0	6.1	12.0

by

H. W. Thurston, Jr.

Dept. of Botany
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State College, Pa.

Taylor; Pennsylvania—H. W. Thurston, Jr. and W. A. Chandler; and Virginia—A. B. Groves.

Tables 5 and 6 are illustrative of the results of these more recent tests on apples, and indicate the efficiency of glyoxalidine for the control of apple scab. It should be pointed out, however, that in order to obtain the highly satisfactory control indicated in these tables as well as in Tables 1 and 3, the applications must be made prior to major infection periods. Glyoxalidine is a *protective* fungicide and not an *eradicant* one. Failure to control apple scab may be experienced if applications of glyoxalidine are not made according to a well timed preventive schedule. This point is illustrated by some recent results from Pennsylvania (Table 7), where glyoxalidine is compared with fungicides which do have eradicant properties, such as "Tag 331" and Liquid Lime Sulfur.

Typical of the more recent field trials with "Cherry Fungicides 341B," are the figures from New York State shown in Table 8. While the years 1947 through 1949 were periods of only light or moderate leaf spot infection in New York, these data on foliage retention are in line with the data in Table 2 obtained earlier in Pennsylvania, Virginia and West Virginia.

In southern Pennsylvania, the cherry growing area with which the author is most familiar, an outbreak of leaf spot can be counted on in any year that the early season rainfall is adequate for the spread of the fungus. Failure to control leaf spot in Pennsylvania in 1925 caused the loss of 25,000 trees, and an additional

TABLE I[1]

Defoliation and Leaf Spot Control on Sour Cherry, Var. Montmorency, 1942 to 1945

Pennsylvania

Treatment	Percent leaves remaining				Percent disease-free			
	Sept. 1 1942*	Oct. 1 1943	Oct. 1 1944	Oct. 1 1945	Sept. 1 1942*	Oct. 1 1943	Oct. 1 1944	Oct. 1 1945
Check	0.1	35.1	3.5	0.0	0.0	9.4	0.0	0.0
Bordeaux**	68.8	63.3	70.2	45.3	80.2	63.8	100.0	9.3
Lime Sulphur 2-100	3.9	77.2	69.7	0.0	0.0	54.8	30.2	0.0
Fermate 1-100† (ferric dimethyl-dithiocarbamate)	39.3	78.9	—	—	19.3	49.5	—	—
2-Heptadecyl-glyoxalidine 1-100	86.7	86.2	96.0	95.4	97.0	75.2	95.6	21.1
Dithane (disodium ethylene bis-dithiocarbamate) 1-100	—	—	25.0	20.7	—	—	0.0	0.0
Phygon 1-100 (dichloro-naphthoquinone)	—	—	91.3	31.6	—	—	60.1	0.5

Virginia

Check	0.0‡	24.6	4.0	0.0	—	0.0	0.0	0.0
Bordeaux**	83.9	72.6	93.8	0.6	—	90.6	99.6	0.0
Lime Sulphur 2-100	1.7	56.7	68.5	0.0	—	22.2	1.9	0.0
Fermate 1-100†	33.3	64.0	—	—	—	37.6	—	—
2-Heptadecyl-glyoxalidine 1-100	88.4	90.1	94.9	21.4	—	91.0	97.8	0.0
Dithane 1-100	—	—	35.2	0.0	—	—	3.1	0.0
Phygon 1-100	—	—	82.1	2.5	—	—	37.0	0.0

West Virginia

Check	0.0	46.8	—	—	0.0	—	—	—
Bordeaux**	79.9	50.2	—	—	72.3	—	—	—
Lime Sulphur 2-100	0.1	59.9	—	—	0.0	—	—	—
Fermate 1-100†	18.3	61.9	—	—	3.3	—	—	—
2-Heptadecyl-glyoxalidine 1-100	96.1	88.4	—	—	97.3	—	—	—
Dithane 1-100	—	—	—	—	—	—	—	—
Phygon 1-100	—	67.7	—	—	—	—	—	—

*Courtesy of Dr. H. J. Miller.
**In 1942 and 1943 the Bordeaux formula was 2-8-100; in 1944 1.5-6-100; in 1945 1.5-4-100.
†In 1943 Fermate 1.5-100.
‡In 1942, all counts October 1.
[1] Reprinted from Contributions from Boyce Thompson Inst. V. 14, P. 167, 1946.

TABLE 3*

2-Heptadecylglyoxalidine Vs. Lime Sulphur on Apple

A. Variety McIntosh

Treatment	1944		1945		
	Percent scabby leaves	Leaf area per spur	Percent scabby leaves Spurs May 21	Spurs Aug. 9	Terminals Aug. 9
Check (unsprayed	85.0		63.2		
2-Heptadecyl-glyoxalidine 1-100	21.6	15.3	4.8	7.4**	30.0**
Lime sulphur 1-75	38.0	13.5	3.4	16.4	48.9

B. Variety Stayman

Treatment	Percent scabby leaves	Leaf area per spur	Percent scabby leaves	Leaf area per spur
Check (unsprayed)	86.0		59.5	
2-Heptadecyl-glyoxalidine 1-100	22.2	14.3**	5.8	12.5
Lime sulphur 1-75	23.8	12.5	2.8	11.5

*Reprinted from Contributions from Boyce Thompson Inst. V. 14, P. 165, 1946.
**Highly significant differences.

TABLE 4

Effect of Certain Fungicides on Size of Cherry Fruit

Treatment	Number of cherries per pound												
	1942			1943			1944		1945	1946		1947	
	Pa.	Va.	W. Va.	Pa.	Va.	W. Va.	Pa.	Va.	Pa.	Pa.	Va.	Pa.	Va.
Check	96	95	96	129	116	119	144	111	110	109	111	—	113
Lime Sulphur 1-100	106	101	107	140	118	126	159	128	117	127	109	—	119
Bordeaux 2-8-100	112	103	107	159	128	136	166	137	137	—	—	—	119
2-Heptadecyl glyoxalidine 1-100	95	89	94	131	101	119	133	117	109	111	101	—	114
Fermate 1-100	96	91	98	146	124	133	—	—	—	115	—	—	122

TABLE 5

Apple Scab Control—State College, Pennsylvania

Per Cent Apple Scab

Fungicide Applied and Dosage per 100 gal.	McIntosh			Stayman		
	Spurs	Terminals	Fruit	Spurs	Terminals	Fruit
			1947			
Crag Fungicide 341C— ½ lb.	8	12	29	4	18	7
Crag Fungicide 341C— 1 lb.	6	4	10	5	7	2
Lime Sulfur 1½ gal.	4	16	14	3	10	3
None	44	96	100	36	98	98
			1948			
Crag Fungicide 341C— ½ lb.	7	22	23	4	15	9
Crag Fungicide 341C— ¾ lb.	6	7	18	4	8	6
Lime Sulfur-Fungicide 341C— 1½ gal.—½ lb.	5	22	32	4	10	10
Lime Sulfur-flotation Sulfur—1½ gal.—10 lbs.	7	33	31	3	7	6
None	100	100	100	100	100	100

TABLE 6*

Apple Scab Control in Eight States from 1949

	Ill.	Maine	N. J.	N. Car.	Ohio	W. Va.	Pa.	Va.
Check	28	97	100	42	—	—	100	99
Crag 341C	3	2	14	1	0	7	1	1
Sulfur	4	—	28	2	2.5	10	7	—
Tag 331 ½ pt.	6	5	21	1	—	17	1	6
Fermate	—	—	59	2	—	13	13	26

*From American Phytopathological Society—Report of the Committee on Coordination of Field Tests with new Fungicides.

killing of buds, spurs and whole branches on many thousands more. Dr. F. H. Lewis of the Pennsylvania Fruit Research Laboratory is authority for the following figures: In 1945, check trees in his spray plots were two thirds defoliated by the 28th of June and completely defoliated before October 1st. In the same plots, trees sprayed with "341," retained 99 per cent of their foliage on the 28th of June, and 95 per cent on October 1st. In 1946 these plots were sprayed alike, yet those which had suffered severe defoliation in 1945, yielded only 36 pounds of cherries per tree in 1946, while those trees which retained their foliage in 1945, yielded 107 pounds of cherries per tree in 1946. In addition to this great difference in yield there was also a pronounced difference in grade. The 36 pound yield graded out 56 per cent No. 1 cherries, and the 107 pound yield graded 79 per cent No. 1 cherries.

In connection with some of their tests in 1947, Mills and Van Geluwe made measurements in December of a number of terminals from trees sprayed with five applications of a low-soluble copper. The terminals from the "341-B" sprayed trees were not only longer, but averaged more buds per terminal and the buds themselves were about 7 per cent greater in diameter than on trees receiving the low-soluble copper sprays. In 1948 the owner of these trees reported higher yields from the trees which had received "341-B" the year before, thus substantiating the bud counts of the previous December. Since 1947 was not an outstandingly severe year so far as leaf spot is concerned, it is of interest that increased yields from the use of "341-B" can be expected in average years as well as in epidemic years, such as that reported by Lewis from Pennsylvania.

Glyoxalidine contains neither sulfur nor metal of any kind, which may explain in part its compatibility with most of the widely used insecticides as well as with other fungicides. It has been shown by Wentzler and White (8) that glyoxalidine "(Crag 341C)" increases the chlorophyll content of apple leaves significantly, (Table 9), and that such increase is greater than the increase resulting from a similar number of applications of "Ferbam." The molecule carries over eight per cent of nitrogen by weight and it may well be that absorption of some of this nitrogen through the leaves is responsible for the noticeably better color and increased leaf area.

Where "Crag 341C" has been used on apples as the only fungicide throughout the season it has, in addition to controlling scab, prevented a serious buildup of European red mite. Hilbborn and Lathrop (3) have reported results from Maine, covering a three year period during which it was not necessary to apply any acaricide to plots sprayed with glyoxalidine, while in adjacent plots sprayed with sulfur, two or three applications of an acaricide were necessary in each of the three years.

The toxicological picture with respect to glyoxalidine is very favorable. Both short and long continued feeding tests on rats and guinea pigs, as well as tests for skin penetration and irritation, all indicate that these fungicides are safe to use and that there is little toxicological hazard from spray residues on the fruit. The

usual precautions practiced with all agricultural spray materials should of course be followed. Concentrated preparations may be injurious to the eyes, but dilutions such as are used in field spraying are no more irritating than soap shampoos.

"Crag 341-C" as formulated for the past three years is a solution of glyoxalidine acetates in isopropanol. For field use, one quart of this isopropanol solution is added to each 100 gals. of water in the spray tank after which the glyoxalidine (free base) is precipitated by the addition of ½ lb. of spray-grade hydrated lime. While the control of apple scab with this product appears to have been uniformly satisfactory, there have been occasional reports of foliage injury and fruit russet, especially when glyoxalidine was used under conditions of unreasonable high temperature in early season applications. In the manufacture of glyoxalidine, stearic acid is used as the source of the straight chain substituent. Since commercial stearic acid, from animal sources contains appreciable amounts of palmitic acid and small amounts of oleic acid, this means that the glyoxalidine produced is not pure 2-heptadecyl glyoxalidine, but contains, also some 2-pentadecyl glyoxalidine, and a small amount of heptadecenyl glyoxalidine.

Chandler & Thurston (1) in 1948 and McCallan (5) in 1949, working with glyoxalidine made from purified fatty acids were able to demonstrate that much of the injury previously reported was due to the presence of the heptadecenyl fraction resulting from the oleic acid. In McCallan's (5) experiments, he was able to use a glyoxalidine made from 98 per cent pure stearic acid which he reported as being "several-fold less injurious," than that made from the ordinary commercial stearic acid. McCallan was also able to demonstrate that foliage injury was greatly increased by spraying under conditions of high relative humidity and high temperature and that injury became pronounced at temperatures 90° and above. Since these experimental findings are substantiated by field observations covering most of the known cases of erratic behavior under field conditions, the remedy should be obvious; on the part of the producer a purer product, on the part of the consumer—knowledge gained by experience concerning the adaptations of a new material to his own particular situation.

TABLE 7

Comparison of Protective vs. Eradicant Spray Schedules

Treatment	Percent Scab at Harvest	
	Applications in a well timed preventative schedule	Applications made following major infection period
Check (unsprayed)	92	100
Crag 341C	3	15
Fermate	6	20
Liquid Lime Sulfur	—	7
Tag 331	4	6

"Cherry Fungicide" is the formulation of glyoxalidine that has found favor with cherry growers. It is a white flowing wettable powder containing 30% by weight of mixed glyoxalidine and 3% of 1-Hydroxyethyl 2-heptadecyl glyoxalidine dispersed in kaolin. It has been shown to be safer for use on cherries than the "C" formulations and has supplanted the original formulations used previous to 1946. In its comparatively short existence it has already won definite recommendations from Experiment Stations in two of the principal cherry producing states.

TABLE 8

Cherry Leaf Spot Control in New York State*

Material	Per Cent Leaf Drop and Leaf Spot		
	Oct. 1947	Oct. 1948	Sept. 1949
341 B	77	12	15
Copper (Cuprok)	84	22	35
Fermate	—	15	22
Unsprayed	—	—	66

*Unpublished data of W. D. Mills and J. D. Van Geluwe.

Although accurate evaluation of any new fungicide is of utmost importance in preliminary stages, its performance in the hands of the farmer in a great variety of situations, many of them entirely unthought of by the original researchers who developed the product, will determine its ultimate success or failure. That glyoxalidine has passed the preliminary phases has been amply demonstrated. That it will prove a valuable tool in the fruit grower's hands is confidently predicted. ★★

Literature Cited

(1) Chandler, W. A., and Thurston, H. W., Jr. The constituents of "341" as apple scab fungicides Phytopath. 39:4. 1949.

(*Turn to Page 99*)

TABLE 9

Milligrams of chlorophyll per 100 sq. cms. of McIntosh leaves sampled August 23.

Treatment	Mean
Check (no sprays)*	2.3
Crag 341 (8 applications)	3.1
Ferbam (8 applications)	2.8
Least significant difference 5%	0.5

Milligrams of chlorophyll per 100 sq. cms. of Stayman Winesap leaves sampled August 23.

Treatment	Mean
Check (no sprays)	4.0
NuGreen (3 applications) plus sulfur	3.6
NuGreen (3 applications) plus CRAG 341 (7 applications)	4.3
Crag 341 (7 applications)	4.1
Ferbam (7 applications)	3.9
Least significant difference 5%	0.4

*Check trees badly infected with scab.

Raw material supplies, residue tolerances, possibility of defense production, Sabath Resolution among topics on agenda at Spring Lake. Three day session marks the

17th Annual NAC Meeting

OVER 300 leaders of the agricultural chemical industry were expected for the opening on September 6, of the Seventeenth Annual Meeting of the National Agricultural Chemicals Association, to be held at the Essex and Sussex Hotel, Spring Lake, New Jersey. Program for the three-day meeting features leaders from industry, government, the agricultural press, and a series of NAC Committee meetings.

Among the speakers named on the program were: Charles Concannon, Chief, Chemical Division, U. S. Department of Commerce; Avery S. Hoyt, Chief, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture; Mercer Rowe, Jr., Flag Sulphur and Chemical Company; Lloyd E. Beilke, the Interstate Manufacturers Association; Ruel C. Stratton, Supervisory Engineer, Travelers Insurance Company; Dr. Bernard E. Conley, American Medical Association; Fred Bailey, Executive Director of National Agricultural Research, Inc. Participating in the Panel Discussion are: Dr. Victor R. Boswell, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Dept. of Agriculture; Dr. S. A. Rohwer, Bureau of Entomology and Plant Quarantine, U.S.D.A.; and Dr. Charles L. Smith, Ethyl Corporation, New York. The Association will be represented on the program by Ernest Hart, President; Lea S. Hitchner, Executive Secretary; E. C. McClintic, Chairman, Traffic Committee; and John D. Conner, Special Counsel.

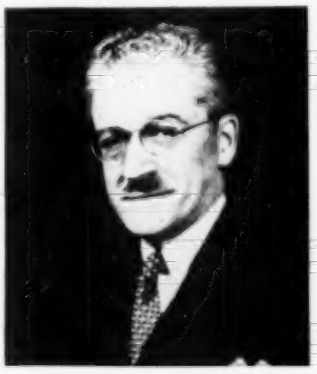
Industry's role in defense production was expected to be commented upon by several speakers and during general discussion periods with attention focused upon needs of agricultural chemicals for food and fiber production and supplies of the raw materials required by the industry to produce them.

The ability of manufacturers to supply the tremendous call for agricultural chemicals resulting from record insect invasions in parts of the

Charles L. Smith
Appears on Panel

John D. Conner
Association Special Counsel

Charles Concannon
Speaks for Commerce Department



Avery S. Hoyt
Chief of B.E.P.Q. in Debut

W. Mercer Rowe
Talks from Industry Viewpoint

Dr. S. A. Rohwer
B.E.P.Q. Assistant Chief Speaks

nation and expanding uses of materials was also scheduled for discussion.

These subjects along with programs for safe and effective use, and topics of a technical nature, were expected to crowd the general meeting sessions Wednesday and Friday.

The annual dinner, always a popular feature of the meeting, was scheduled for Thursday evening, and in accordance with the wishes of the membership, speeches were to be omitted.

Below: Essex & Sussex Hotel.

Benzene & Chlorine among shortages in

Insecticide

SOME adjustments in purchasing plans are very much in order due to the possible shortages of materials for the coming insecticide year if the tense international situation worsens. It will be necessary more than ever for insecticide formulators to take in their supplies of chemicals as they become available, and not to wait until late winter and early spring to purchase. Industry spokesmen, in commenting on the matter, were quick to emphasize that with the uncertainty of their own raw materials, more careful production and distribution plans must be made in order to assure adequate supplies and proper localized distribution for field use next season.

By the same token, distributors, dealers and even consumers should take in "insurance" supplies of formulated pest control materials in advance of the consuming season, it has been reiterated in the trade. In this way, the burden of inventory will be spread out from manufacturer through the formulator to the mixer, the distributor and finally to the consumer.

In view of the upset in the production and distribution pattern of this past season, the lesson of "buy early" should be emphasized even at this early date.

The current agricultural season now drawing to a close has been marked by increased production of many of the synthetic materials, but there were shortages nevertheless. Both technical DDT and technical BHC were practically at premiums for spot delivery during the June-July period and even contract customers were considerably inconvenienced by the lack of supplies which they had hoped to receive.

The actual production of technical DDT during the first four months of 1950 was as follows:

3,364,000 lbs. in January
3,740,000 lbs. in February
4,374,000 lbs. in March
6,152,000 lbs. in April

Thus, about 17,000,000 lbs. were produced in the first four months of 1950 as compared with a total production of just about 37,000,000 lbs. for the entire year of 1949. It is agreed by most industry spokesmen that there was more technical DDT actually available for the current insecticide season than had been available during the 1948-49 season. However, the current season started out with a definite shortage due to the low inventories on hand as of October 1, 1949. Production of the technical material continued at a low ebb during the fall and early winter months, and it was not until January and February that production really began to pick up to any great degree. This is borne out by the following production figures:

October 1949	**2,486,000 lbs.**
November 1949	**1,819,000 lbs.**
December 1949	**2,874,000 lbs.**

DDT, in general, was readily available and at reasonable prices during December 1949 and January 1950. The age-old problem that is characteristic of the agricultural chemical industry, that of not preparing in advance for materials, is again the basic cause for the lack of insecticide formulations in the field—certainly as far as DDT is concerned.

The story was repeated to some extent also for BHC where the following production figures will well illustrate this story again:

September 1949	**2,734,000 lbs.**
October	**2,335,000**
November	**1,880,000**
December	**1,820,000**
Total 1949	**22,115,000 lbs.**
January 1950	**2,369,000 lbs.**
February	**3,181,000**
March	**4,320,000**
April	**4,550,000**

Here again production fell off considerably during November and December, although it is generally conceded that chlorine and benzene were available during November, December and January in sufficient quantities to take care of requirements for additional production.

Supply of insecticides for corn borer control in the midwest was ample this year. Weather was the deciding factor in influencing actual consumption of insecticides in this area since heavy rains contributed greatly to the destruction of this insect. The actual movement of insecticides in the midwest was spotty since in certain areas the volume of material sold and consumed was great, while in others it was disappointingly small. It is the opinion of many in the industry that the carry-over of 25% material which would normally have been stored over the winter was moved instead into the southeastern and southwestern areas for use in the cotton control program.

Supplies

by

Melvin Goldberg

Pesticide Advisory Service
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Parathion and ryania were readily available throughout the season, although there were some spotty shortages at times.

Cotton Toxicants Short

THE cotton insecticide supply was quite short since this past season saw probably the heaviest infestation of cotton insects in many years. The U.S. Department of Agriculture reported that insecticides were being used more widely and in larger quantities for cotton insect control than during any previous year for which records are available. It was pointed out that the prospects of satisfactory yields of cotton were now promising, where otherwise, prospects would have been very poor had it not been for the use of insecticides during June and July. The agricultural insecticide industry can be proud of the job of production and distribution performed during the past season despite many supply difficulties and the usual last-minute rush which is characteristic of the industry.

Even as of this writing, the boll weevil situation continues extremely critical, and during the best part of August, the weevils were expected to continue to take heavy tolls of cotton plants and hence the yields of cotton will be further reduced.

It was noted in a report issued in the early part of August that the boll weevil was causing more damage than in 1949 and, in fact, the cotton crop was estimated to be about 36% less than last year's production. A major part of the reason for this poor crop was the unfavorable weather conditions and insect damage. Extremely heavy boll weevil damage was indicated in North Carolina, North Georgia, Alabama, Oklahoma and parts of Arkansa and Louisiana.

The supplies of technical grade toxaphene were ample and comfortable up until the time of the chlorine strike which caused a shortage of material that would have been delivered in June, July and August.

Outlook for Materials

THE outlook for many of the essential raw materials required in agricultural pest control for the coming season is pessimistic in view of the emergency created by the Korean situation. Aside from any impact which the military requirements for insecticidal raw materials may have, there is the even greater problem that the unbalance which comes to the civilian economy in such times may curtail quantities of the raw materials required to produce insecticides for agricultural use. Chlorinated hydrocarbon materials such as DDT, BHC, toxaphene and similar materials, were not a part of the insecticide industry during the last war. Technical DDT was produced to the extent of about 30,000,000 lbs. during World War II, but all of its production was channeled to the military. Only a small fraction of this production was extended for so-called direct non-military use. These chlorinated synthetic materials are presently requiring large quantities of chlorine and benzene in particular, resulting in shortages particularly in benzene supplies. Therefore, it is reasoned by many in the industry that production of DDT and BHC under more stringent emergency conditions, will certainly be affected by the raw material shortage. Confirmation of this threat is evidenced in the recent firming of the price of DDT to a 34¢ CL level about August 1st.

The situation during the past season was aggravated primarily by a benzene shortage which began to show itself during the coal strike. But even with coal production again resumed on a full scale, there was simply not enough benzene available to take care of all requirements. In addition, the chlorine picture grew much worse with the advent of two crippling strikes which hit during the summer months, affecting a major portion of the domestic production of chlorine. It is reasonable to expect that both BHC and DDT will command higher prices during the 1950-51 season than were prevalent during this past season.

There are other materials necessary for pesticidal chemicals that will be affected if the world situation should grow more serious:

Pyrethrum: The natural pyrethrum supplies in this country are presently low, but the outlook for

(*Turn to Page 97*)

Milestones of the Mid-Century in

Fertilizer

THE major events in the field of U. S. fertilizer chemistry in the first fifty years of the century, are those processes and discoveries which have made the country self-sufficient in the requirements of the major plant foods, and the researches which have led to increased knowledge of how these nutrients are best utilized in plant feeding.

There are ten plant food elements required in considerable quantity for growth: (1) carbon (2) hydrogen (3) oxygen (4) phosphorus (5) potassium (6) calcium (7) magnesium (8) iron (9) nitrogen (10) sulfur. Of these, only phosphorus, potash and nitrogen are usually thought of as being added to the soil in commercial fertilizer, and the price of so-called complete fertilizers is determined by the content of these elements. However, calcium and magnesium are usually added in the form of lime or dolomite, and sulfur in the form of sulfate radical in the fertilizer salts.

There is an additional group of plant food elements usually required in smaller quantities, and hence frequently referred to as "minor" or "trace elements." These are manganese, boron, copper, zinc and cobalt. Deficiencies of these elements are being noted increasingly in certain areas, and fertilizer demands for elements such as manganese have become substantial. They are all in adequate supply, however.

The great tonnage requirements of the fertilizer industry are for sulfur, phosphorus, nitrogen and potassium, and the consumption of these four elements makes up a considerable portion of the demand of the heavy chemical industry today. At the beginning of the century, there was practically no production of the compounds of these elements within the confines of the United States. Four great discoveries have made us self-sufficient with respect to all four. These milestones were the discovery of:

(1) The Frasch process and its application to the sulfur domes of Louisiana and Texas.

(2) The Haber-Bosch process for synthetic ammonia, and its application in this country, using both coal and natural gas as raw materials.

(3) Discovery of the Florida deposits of phosphate rock, and the use of the flotation process for recovery.

(4) Discovery of the Carlsbad, N. M. deposits of potash, and their recovery by flotation.

It has already been mentioned that sulfur is a plant nutrient. However, its chief function in commercial fertilizers is to act as a carrier for other plant food elements. Treatment of phosphate rock with sulfuric acid forms monocalcium and dicalcium phosphates, making the phosphorus available in soluble form; ammonium sulfate fixes the ammonia of coke oven liquors, as well as synthetic ammonia, and makes it available as nitrogenous plant food; and potash must be applied in the form of potassium sulfate for certain crops, such as tobacco. These uses make the fertilizer industry the major consumer of sulfur and sulfuric acid, and make an assured supply of these materials necessary to its very existence.

TABLE I
Sulfur Statistics

	Sulfur Mined	Sulfur for H_2SO_4	Acid from S	Total Acid
1945	3,753,188	2,213,000	7,080,000	9,137,000
1946	3,859,642	2,070,000	6,628,000	8,649,000
1947	4,450,000	2,456,000	7,890,000	9,910,000
H_2SO_4 Used in Fertilizers				
1944	2,600,000			
1945	2,850,000			
1946	3,020,000			
1947	3,510,000 — 35% of total acid; 78% Acid from Sulfur			

Frasch Process

PRIOR to World War I, the development of the sulfuric acid industry in the United States depended largely upon growth of the fertilizer business in the South and later upon the increased amount of petroleum refining in the East and North. In 1882, 85% of all sulfuric acid produced in this country was made from brimstone. By 1895 the figure had decreased to about 75% and by the early 1900's, the use of brimstone had been almost eliminated due to lack of domestic supply. From 1892-1902, Herman Frasch worked on the development of a process for recovery of sulfur from certain limestones in the salt dome cap rock of Louisiana and sulfur was first produced commercially in 1903. However, the great bulk of sulfuric acid produced was from pyrites and as late as 1914 only 2.6% of the acid manufactured was from brimstone. At this time, about

*Presented before the American Institute of Chemists at its Annual Meeting, May 12, 1950.

63% of the total acid produced was consumed by the fertilizer industry.

Sulfur imports fell from a maximum of 200,000 long tons in 1902 to zero in 1917, and since '17, the United States has been a large exporter of sulfur.

Between 1880 and 1901, the sulfur production of the United States was less than 8,000 long tons per year. By 1906, production had grown to 300,000 long tons. During the next ten years, production fluctuated widely but averaged about 400,000 long tons per year. The large increase in sulfur consumption was due, however, to the growth of the paper pulp and other chemical industries, and not to any material increase in the use of brimstone for the manufacture of sulfuric acid. Between 1910 and 1915, less than 1/10 of the brimstone produced was used for sulfuric acid. During World War I, the requirements for sulfuric acid were greatly increased and because the submarine blockade made shipping of pyrites from Spain difficult, manufacturers were forced to turn to brimstone from Texas and Louisiana. Large quantities of sulfuric acid from brimstone have been manufactured ever since.

Before the Frasch process was developed, the sulfur industry of the world was controlled by Sicily. The brimstone is mined from sedementary rocks composed of marl, shale and gypsum.

Haber Process

THE Haber Process was fathered by the Badische Anilin and Soda Fabrik, which later became part of I. G. Farben. The catalytic process is credited to Dr. Haber; the problem of supplying the raw gases cheaply and in the large quantities required was solved by Dr. C. Bosch. By 1913, about 30 tons of ammonia per day were being produced in Germany by the Haber Process, but it was not until 1921 that the first successful ammonia synthesis unit was erected in the United States by the Atmospheric Nitrogen Corporation, then a subsidiary of the General Chemical Company and Solvay Process Co. The difficulties experienced at the Government plant, erected during World War I at Muscle Shoals, were successfully overcome.

The first large commercial installation (which is still in operation) is the Belle, W. Va. plant of E. I. duPont de Nemours & Co. This plant was built in 1926. In 1928 Allied Chemical & Dye Corporation completed a plant at Hopewell, Va., and Commercial Solvents, a plant at Peoria, Ill. This plant was later converted to methanol.

The Shell Chemical Company in 1931 completed the first American plant to use natural gas as a source of hydrogen. Five small plants using by-product hydrogen from electrolytic caustic and soda were erected from 1926-1932. Hercules Powder Company constructed a plant in 1940 using natural gas as a source of hydrogen.

At the beginning of World War II, these nine plants had an estimated capacity of 459,000 tons per year, of which about 194,370 tons were consumed by the fertilizer industry. The great demand for ammonia during World War II resulted in almost tripling of the pre-war capacity. This increase was made by enlarging existing plants and erection of 10 new plants built with Government funds. These plants cost over $250 million.

The nineteen plants operating in 1949 were capable of producing nearly 1,750,000 tons of synthetic ammonia per year. In 1949, ammonia production was 1,167,500 tons of which 702,500 tons were consumed by the fertilizer industry.

Chemistry

by

Dr. C. E. Waring

Davison Chemical Corporation

Baltimore, Maryland

Phosphate Rock-Flotation

RECOVERY of phosphate rock fines by flotation was developed by the Phosphate Recovery Corporation of Mulberry, Florida. The flotation process supplements the usual washing operations, allowing hitherto impractical areas to be worked economically. The phosphatic particles of minus 20 mesh comprise from about 20% of the total phosphate in the lower grade rock (66 to 68% BPL), deposits up to 85% in the higher grade deposits, though there are high grade deposits containing as little as 50% minus 20 mesh material.

Potash

THE most extensive deposits of soluble potash salts are those at Stassfort, Germany, which supplied nearly all the world's requirements until 1914. Deposits have since been developed in Upper Alsace, France and near Kalisz, Poland. The need for a domestic potash source did not arise until 1910. In 1911, an extensive search was begun by several government agencies which together with private interests, led directly to the establishment of the present potash industry in the United States. Early explorations were made at ancient

Figure 1

EFFECTS OF MINOR ELEMENT DEFICIENCIES IN PLANTS

Element	Results of Deficiency in Soil
Boron	Heart and dry rot in beets and turnips; cracked stem in celery; Brown heart of Cauliflower
Copper	Slow or complete cessation of growth. Plants are weak and unproductive. "Heather moor Disease" of oats and barley. Disappearance of better grasses on land in sod.
Manganese	Brittle leaves. "Gray speck" of oats; wheat, barley, potatoes, turnips, kale, beans, peas, flax, clover, spinach and many grasses
Zinc	Stunted growth and reduction of buds. "Rosette" in pecans and apple trees; "mottle-leaf" of citrus; "yellows" of walnuts and "white bud" of corn plants.
Magnesium	Brittle leaves and discoloration of leaf. Non-uniform produce and delayed maturity in tobacco and most crops.
Silicon	Concentration of minerals within plant, interfering with utilization of the nutrients.

lake brines and salt deposits in western areas including Lake Bonneville, of which Salt Lake, Utah is a part, the Owen Valley region of California containing Searles Lake, and the Permian salt beds in New Mexico.

Commercial production of potash at Searles Lake at Trona, California, was begun in 1916 by the American Trona Co. Searles Lake consists of a solid salt deposit permeated by brine containing about 4.7% KCl, 16.35% NaCl and many other chemical compounds. Extensive research in application of the phase rule was responsible for the development. The brines now yield potash, borax, soda ash, salt cake, sodium lithium phosphate and bromine compounds.

In 1917, two wells were drilled specifically for potash in the Permian Basin. One well was in Potter County, Texas; the other at Carlsbad, New Mexico, about 15 miles west of the present development. Neither well revealed any notable quantity of potash and it was not until 1921 that any potash-bearing mineral from that area was definitely identified.

The first shaft in New Mexico was started near Carlsbad by the U. S. Potash Company in December 1929 and was completed in January 1931. The Potash Company of America sank its first shaft in 1933 and completed its air shaft in November 1936. The Union Potash and Chemical Company started its first shaft in September 1936 and completed it in November 1940. (The Union Potash & Chemical Company is now International Minerals and Chemical Corporation).

At Carlsbad, salts are mined by the room-and-pillar method used in coal mining. Normally 50% of the salt in the area is recovered in the first mining. The deposits are a mixture of approximately 40% synite (KCl) and 60% halite (NaCl). The Bureau of Mines first undertook to apply ore dressing methods to production of potash of suitable fertilizer grade. The investigation was continued under a cooperative agreement between the Bureau of Mines, the Potash Company of America and the Missouri School of Mines. Flotation methods were found satisfactory when sulphated aliphatic alcohols were used and excellent recoveries were made with low reagent consumption. The salt recovered is subsequently processed and purified by fractional crystallization. The deposits at Carlsbad began shipments in 1931.

Price History

IN 1913 muriate was quoted at 76c a unit. In December 1915, it reached $9.87/unit or $905 a ton of pure potash equivalent in muriate. The price did not drop below $1.00/unit for any grade from March 1915 to April 1921. During part of the season 1934-1935, potash sold as low as 27c/unit on the Atlantic Seaboard. The importance of the New Mexico deposits is reflected by the enormous drop in price over 20 years. In 1948, muriate of potash was quoted at 37½c/unit at Carlsbad. The unit price at Trona was 45.5c.

Production

PRACTICALLY all of the domestic potash is supplied by Searles Lake and the Permian deposits in New Mexico. About 85% of the production is from the Permian deposits of the Carlsbad region.

In 1935, 76.4% of the world production of potassium salts from minerals or brines was German-French. The United States produced 7.7% of the world supply and imported 13.9%. In 1938, the United States imported half of the domestic requirements of potash. However, production of 508,000 tons in 1938 in the U. S. increased to 923,000 tons in 1946.

In 1941 and 1942, the United States produced its entire needs for potash for the first time. The potash is produced principally as high grade salt of 98% KCl. About 90% of the production is used in the fertilizer industry.

The ten plantfood elements required in considerable quantity for growth have been enumerated previously. Several other elements are used in small quantites and recently cases have been reported where plants were suffering from lack of manganese, boron, copper and zinc. Much

TABLE II

Potash Production & Consumption

Year	Production	Consumption	Year	Production	Consumption
1919	45,700	85,000	1937	266,900	556,000
1920	41,400	266,000	1939	366,300	382,000
1923	19,300	227,000	1941	531,000	490,000
1925	25,800	283,000	1943	732,200	679,000
1927	49,500	293,000	1945	870,000	809,000
1929	57,500	374,000	1947	1,000,000	960,000
1931	63,800	262,000	1948	1,025,000	1,000,000
1933	139,000	293,000	1949	1,050,000	1,050,000
1935	224,700	420,000	1950	1,100,000	1,150,000 (Estimated)

interest has centered around these elements in the past few years.

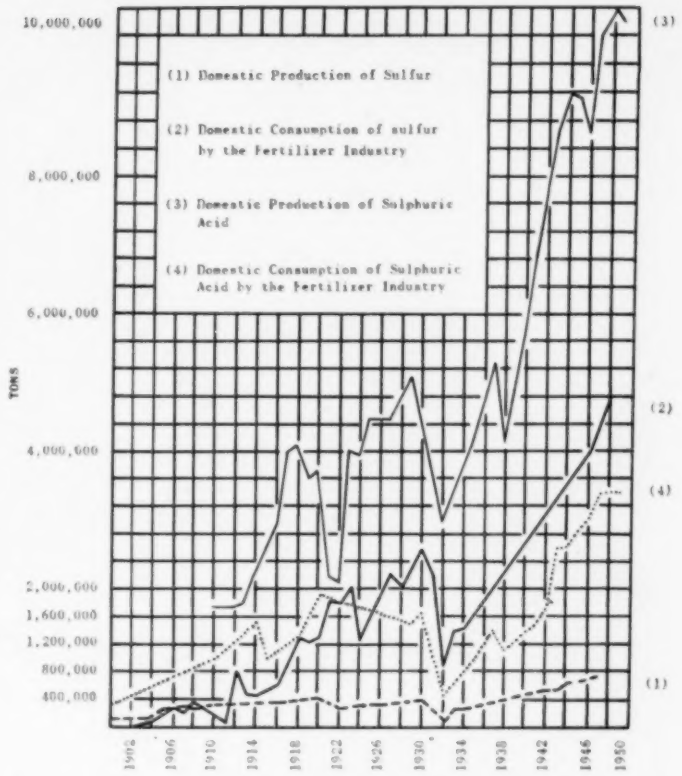
Lack of boron in soils causes the disease known as cracked stem in celery, heart rot and girdle of beets or brown heart of cauliflower. Sugar beets have been found to develop heart rot on certain soil-types because of insufficient boron. This difficulty has usually, but not always, been observed on soils naturally well supplied with lime or soils which have received a sufficient application of lime to make them sweet. New Jersey is recommending a minimum of 5 lbs. of borax for all fertilizers sold in that state.

Black spot on red table beets can be controlled by broadcasting 40 lbs. of borax per acre in advance of seeding.

A number of newly developed muck soils in Michigan and other states have been found to be deficient in zinc for the growth of onions. Soils in Georgia deficient in zinc are responsible for "rosette" in pecans.

As soon as a need for plant-food elements not usually added to fertilizer is determined by reliable experiments, the fertilizer manufacturer compounds his formulas to provide the deficient nutrient.

Figure II



Minor Elements

OUR knowledge of the effects of minor elements in plant nutrition has been gained over the first fifty years of the century and cannot be attributed to any specific date. It is now known that boron, copper, manganese, zinc, magnesium and silicon are necessary to plant nutrition, and the absence of any or all of these elements produces deficiency diseases in plants quite analogous to the well-known vitamin deficiency diseases in animal and human nutrition.

For several reasons, minor element deficiencies are becoming increasingly apparent in many soils. Intensive farming, heavy cropping, high yielding strains of many crops have increased the withdrawal rate. Minor elements were formerly returned to the soil in animal manures. While commercial fertilizers frequently contain minor elements, they are often not in the required proportion, and one or more must be added to make up soil deficiencies.

Granulated Fertilizer

THE addition of rock phosphate and other insoluble fertilizers to soils is much more effective in respect to crop utilization when the materials are applied in powdered form. Pulverization exposes increased surface areas to the solvent action of the soil solutions which makes the nutrients accessible to plants.

The reverse is true of chemically processed fertilizers which are already in easily available form at the time of application to the soil. Since the superphosphate and potash of fertilizers are water soluble, it is necessary to devise means to prevent loss of applied nutrient by too rapid fixation in insoluble forms through chemical reaction with other elements native to soil. Granulation of the finely divided chemical fertilizer is a means of preventing this loss of nutrient.

The granulation process converts the fertilizer to relatively large particles of a roughly spherical shape, thus greatly reducing the area exposed to the leaching action of the soil solutions. Consequently, the fertilizer remains in a readily available form for considerable periods. As a matter of fact, there is evidence that the nutrients within the granules remain available to plant roots without the necessity of leaching from the granules to the soil.

Although granulation is beneficial chiefly to superphosphate, the

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Tremendous strides are noted in technological 'know how' in the fertilizer industry....granulation, improved manufacturing contribute gains

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Off-Flavor Produced in Florida Orange Juice after application of

New Organic Insecticides

by

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R. W. Olsen

Citrus Experiment Station, Lake Alfred, Florida

THAT benzene hexachloride used as a spray in citrus groves in Florida might have imparted a slight musty off-flavor to the juice of oranges, was first observed in the fall of 1946. This was also noted in the 1947 growing season when similar observations were made and some juice was canned.* The off-flavor still persisted in the canned product. Since many of the new organic insecticides have rather persistent odors, it was decided to test several of them for possible effects as off-flavor contaminants of orange juice. Therefore, in 1948, a series of tests were designed to compare not only individual insecticide materials, but also the effect of the time of application of these materials on the citrus fruit.

Two sets of experiments were laid out. One was in a block of orange trees which included three varieties: Hamlins, Pineapples, and Valencias. Five Hamlin, five Pineapple, and two Valencia trees were sprayed on each given date with each of the materials to be used. Spray materials were applied every month starting May 1 and were applied on approximately the first day of the month and during June, July, August, September, October and November. Additional applications were made on the 15th of June, September, October and November. Thus, a total of 11 different spray dates were included throughout the course of the season. The sprays which were applied on July 1 were applied coincident with an oil spray (1.3% actual oil) for scale control. All other sprays were applied without the addition of other materials.

This experiment was originally designed to compare chlordane with toxaphene and benzene hexachloride, but was modified during the course of the summer months to include the use of a high gamma benzene hexachloride. The material used was substituted for BHC on every other spray

* All canned juices mentioned in the report were canned in the pilot plant at the Florida Citrus Experiment Station.

date. It had an original gamma isomer content of approximately 97-98 percent. This, however, did not meet the required specifications for the insecticides which are now known as lindane. Chlordane was used at the rate of 2 pounds of a 50 percent wettable material per 100 gallons; toxaphene at the rate of 6.2 pounds of a 25 percent wettable material per 100 gallons; benzene hexachloride at 4 pounds of a 6 percent gamma wettable material per 100 gallons; and high gamma (25% gamma isomer) BHC at 2 pounds per 100 gallons. These dosages are all considerably higher than would normally be used on Florida citrus trees. It was believed that if no off-flavor developed with these high dosages that from this standpoint it would be safe to use these materials on citrus trees in Florida.

A second experiment comparing parathion with unsprayed controls was conducted in another orange block. In this block the varieties included were Parson Browns, Pineapples and Valencias. Spray dates coincided with those used in the other blocks except that parathion sprays were discontinued after September 1. Parathion was used at the rate of 4 pounds of a 25 percent wettable material per 100 gallons of spray. This is four times higher than would normally be used on citrus in Florida. The juice of all varieties was compared on the basis of taste tests. These tests used a form described by Wenzel (1). Although the testers graded other things besides off-flavor, only off-flavor ratings are considered in this paper. The ratings were scored between 1 and 10 so that 10 represented no off-flavor and 4 or below was assumed to be unsatisfactory. Thus, the higher the number, the less off-flavor present.

Benzene hexachloride sprays should not be used on orange trees which have crop present at time of spray. High gamma content of BHC tends to reduce off-flavor, tests indicate. Oil sprays apparently cause deeper penetration of toxicant into fruit... wettable form better.

Oranges for fresh juice samples were selected so that the same size oranges were picked from all plots. All for any one variety were picked at the same time and stored at 40°F. temperature. They were squeezed on a mechanically driven reamer and juice was dispensed from a vacuum type dispenser so that all juices were served at as near 40° as possible. The Hamlins and Parson Browns which represent early varieties were sampled in December, 1948; the Pineapple oranges in January, 1949; and the Valencias in February. The Valencias were still high in acid and these samples were graded down somewhat due to this factor.

In addition to the tests run on fresh orange juice, all varieties, on at least one spray date, were collected and canned as single strength juice in the pilot canning plant at the Citrus Experiment Station and were then subjected to taste tests three to nine months later. This was done in order to determine whether off-flavor due to insecticide treatment was more pronounced in canned than in fresh orange juice. In almost all cases at least fifteen individuals sampled the juice. Sometimes the numbers exceeded this and on a few occasions it fell as low as twelve. All figures on off-flavor were handled statistically so that where differences were found they could be recognized as significant ones. An effort was made to use the same individuals from day to day, but this was not always possible and the actual group of those sampling juices varied somewhat.

Results and Discussion

THE off-flavor ratings for three varieties of oranges as fresh juices are presented in Table 1. These ratings were made from one through ten with four and below representing an unacceptable juice. A reading of ten would mean that no off-flavor was detected by the taster. No unsprayed check is included in the Valencia variety because sufficient oranges were not available for both canning and fresh fruit tasting. Therefore, the unsprayed oranges were all included as part of the canned product. The ratings in Table 1 represent average ratings regardless of the date of application of the insecticide. It will be noted that in general the ratings for all three varieties run above eight, with the exception of the benzene hexachloride-treated oranges. For all three varieties this rating was below eight. Statistical analyses of variance were run on all three sets of juices. It was found that those treated with benzene hexachloride differed significantly from all others as regards off-flavor, but that timing of the sprays had no effect. It appears safe therefore to conclude that benzene hexachloride does impart a definite off-flavor to oranges when used for fresh juice, and it would naturally follow that benzene hexachloride sprays should not be used on orange trees which

TABLE 1

Off-Flavor Ratings on the Fresh Juice of Three Varieties of Oranges Treated with Different Insecticides.

Variety	BHC	High Gamma	Toxaphene	Chlordane	Unsprayed
Hamlin	7.3	8.1	8.6	8.3	8.7
Pineapple	7.5	8.4	8.7	8.9	9.1
Valencia	7.9	9.2	9.2	9.3	—

have a crop present at the time of spray. It will also be noted that the high gamma benzene hexachloride under both the Hamlin and Pineapple variety are shown as the lowest off-flavor rating of the other four samples. While these samples as a group did not differ significantly from the others, it was found that the July 1 spray in both cases was definitely rated down by the tasters. Apparently actual off-flavor did exist in these juices sprayed on that date. This was attributable to the fact that oil sprays were used at the time of the application of the high gamma material. Apparently the use of oil caused excessive penetration of the material which could impart an odor and a slight off-flavor resulted. This was true only in that spray where oil was included. This ties in with results of the previous year when it appeared that benzene hexachloride used with oil was much more apt to impart off-flavors than benzene hexachloride used simply as a wettable material. Chlordane and toxaphene failed to impart any evidence at all of off-flavor in any of the juice samples tasted.

The results on parathion sprays on the three varieties of oranges to which they were applied are shown in Table 2. Because the parathion was used in a separate block

TABLE 2

Off-Flavor Ratings on Fresh Juice of Three Varieties of Oranges which Compare Parathion with no Treatment.

Variety	Parathion	Unsprayed
Parson Brown	8.4	8.3
Pineapple	7.8	7.3
Valencia	8.9	9.1

different unsprayed controls were used so that the results would be more comparable. Again statistical procedures were followed and no difference could be shown between parathion-sprayed fruit as regards off-flavor rating. It was therefore concluded that parathion even at the high dosage used would not impart off-flavors to Florida oranges.

The canned orange juice samples were tested twice by the taste panel. The results of all three varieties were pooled and analyzed in one analysis. The analysis is presented in Table 3 and the results of the off-flavor ratings are shown in Table 4. Significant differences were found only between insecticide treatments used as in the case of fresh juice where benzene hexachloride was found to be significantly different from the others. In this case the high gamma benzene hexachloride did not differ significantly from other juices tasted. No sample of high gamma benzene hexachloride was included for the Valencia variety because sufficient oranges were not present on the trees to make a canning plant sample practical.

TABLE 3

Analysis of Variance on Canned Orange Juice.

	df	ss	ms
Total	488	2967	
Within samples (error)	460	2667	5.797
Between Variety	2	6	3.000
Between Insecticide	4	142	35.500**
Discrepance	22	152	6.909

**Highly significant

It will be noted that all of the canned juices showed lower off-flavor ratings than did the fresh juices. This was due to the fact that the samples were stored for a period of time and were not tested until several months after they had been actually canned. As a result the off-flavor ratings were lower, but nevertheless the same trends indicated in the fresh juice samples were shown. Some study was made of a comparison between off-flavor ratings and overall acceptance ratings on the canned juices. In a general way it was found that overall acceptance was correlated with off-flavor.

Analyses were made on the amount of soluble solids (primarily sugar) and the percent acid in the juice samples. While these were possibly somewhat of a factor in the overall rating of juices, it did not appear to be a major one as all of the juices tested for any one variety had readings on these two factors which were fairly close together.

The date of application of any of the insecticides did not affect off-flavor ratings except in the case of high gamma benzene hexachloride as noted above. Whether or not high gamma materials of lindane specifications would impart an off-flavor when used with oil still remains to be determined. Apparently any time that benzene hexachloride is sprayed after the setting of fruit an off-flavor will be imparted to the juice. Results and observations from other experimental plots seem to indicate that benzene hexachloride is more apt to impart off-flavors if used in combination with oil. In view of these findings it appears that benzene hexachloride should not be sprayed at a time when fruit is present on the trees and that high gamma benzene hexachloride should not be used in combination with oil.

Summary

BENZENE hexachloride, high gamma benzene hexachloride (from 97-98% pure gamma), chlordane, toxaphene, and parathion were sprayed at different dates on three varieties of citrus throughout the 1948 growing season. Upon reaching maturity, oranges were picked from these plots and were sampled by taste test methods for possible off-flavors in the juice. Samples from all varieties were also canned as single strength juice to ascertain if off-flavors were present in the canned product. All results

(*Turn to Page 99*)

TABLE 4

Off-Flavor Ratings on Canned Juice of Three Varieties of Oranges Treated with Different Insecticides.

Variety	BHC	High Gamma	Toxaphene	Chlordane	Unsprayed
Hamlin	5.1	5.8	6.0	6.2	6.6
Pineapple	4.6	6.6	6.4	6.4	6.9
Valencia	5.3	—	6.7	6.1	5.7

Keeping Livestock Pest-Free Through Wise

INSECTICIDE

HOW to keep dairy cattle free from annoying and energy-destroying insect pests is a problem faced constantly by farmers and custom spray operators. Both the dairy and the animals must be kept free from insect pests and no traces of toxicants are permitted in the milk. (Photos by U. S. Industrial Chemicals, Inc.)

PHOTOS, THIS PAGE

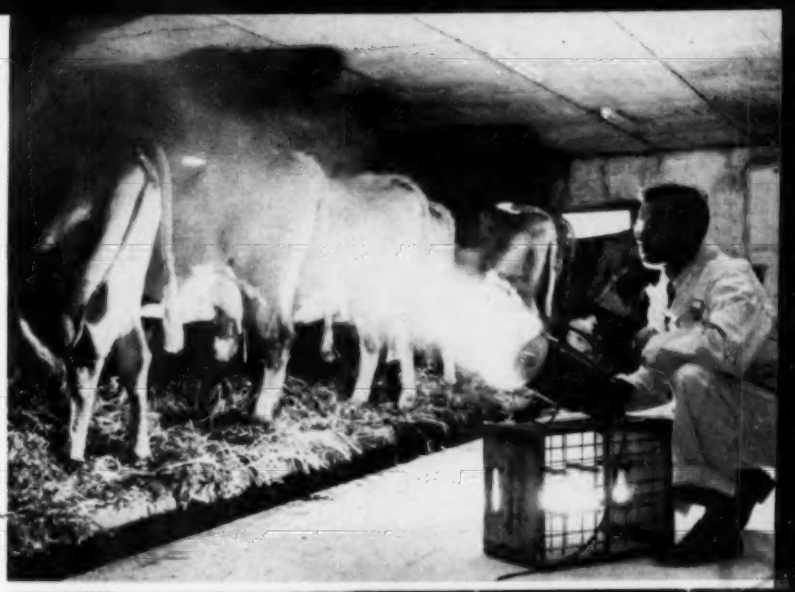
Above (L): Inspecting dairy herd in stalls in preparation for spraying operations. The productiveness of the animals depends to a large degree upon how free of insect pests the area is kept.

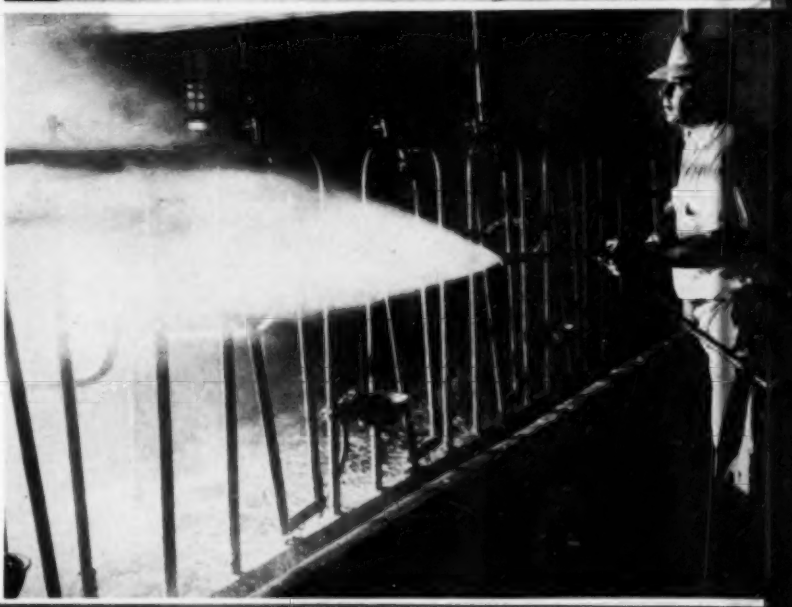
Center (L): A sprayer powered by tractor and filled with "Pyrenone" emulsion is used for applying insecticide to the herd, the walls and stanchions of barns for the control of all kinds of flies.

Lower (L): For protection against horn flies and stable flies, cows often rest their bodies on the ground. This tends to protect the animal's tender skin in places where only a small amount of hair is present. The flies, then, are obliged to feed on other portions of the body.

Below (R): A rare photograph of the tabanid, (*Tabanus sulcifrons*) or horse fly, which is frequently one of the most annoying of all pests attacking cattle.

USE



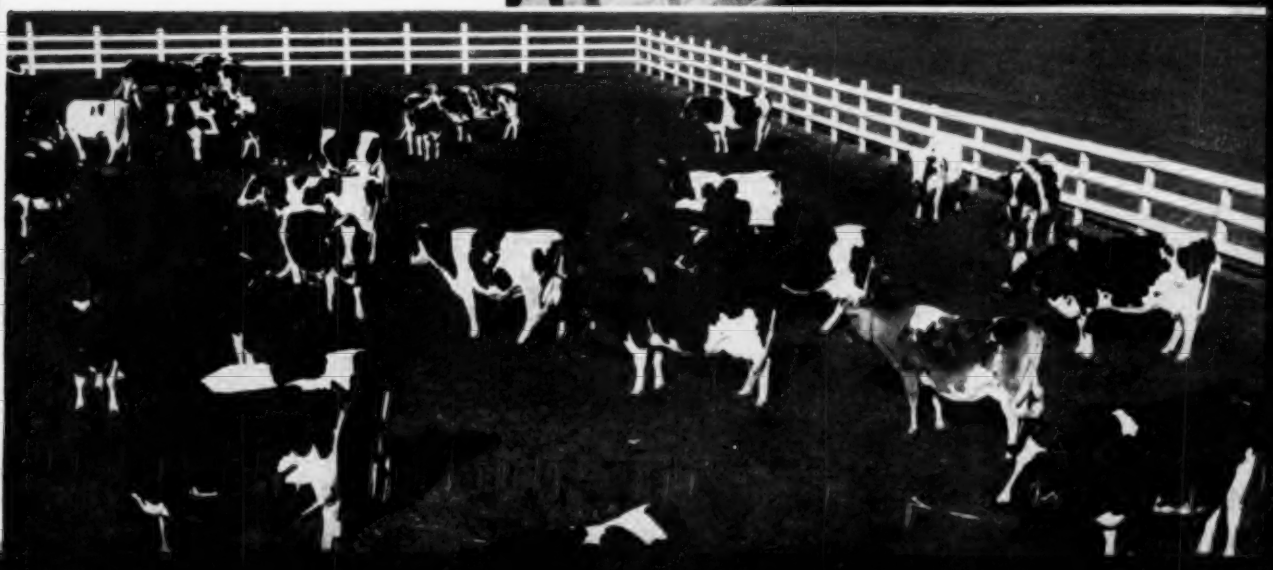


PHOTOS THIS PAGE

Above: Mechanical mist-sprayer adds efficiency in keeping cow quarters free from flies and other insects.

Middle: Control of all flies . . . those that sleep, rest, or walk on stanchions . . . is necessary to maintain a high degree of sanitation in the barn. By using a U. S. D. A. recommended non-toxic residual spray, danger of contamination of milk or meat is held to a minimum.

Below: After following through on the whole fly control program . . . that of regular spraying schedules and the observance of sensible sanitation practices, the herd in the lot is fly-free . . . the cows are quiet and there is no tendency to bunch together in a cooperative program to keep one another brushed free from annoying and costly flies.



Chemical Seed Treatment

The second installment concludes Dr. Leukel's informative article, first part of which appeared in the August issue.

PART II

Cereal Diseases Controlled by Seed Treatment

Barley—The principal seed-borne diseases of barley that are amenable to control by seed treatment are: covered smut, black or false loose smut, stripe disease, and the seedling-blight stages of anthracnose, bacterial blight, spot blotch and scab.

"New Improved Ceresan" and "Cesesan M" applied at ½ ounce, or "Panogen" at 1 fluid ounce per bushel are effective for controlling these diseases.

Oats—Oats are treated chiefly for the control of the loose and covered smuts. Seed treatment also reduces losses due to the seed-borne bacterial blights as well as those caused by species of Helminthosporium, Fusarium, and other fungi. Formaldehyde spray treatment is still widely used for controlling oat smuts, but the organic mercurials, such as the "Ceresans" and "Panogen" are to be preferred, because they are more effective, they protect the seed against soil-borne organisms, and are not injurious to stored seed.

Wheat—Wheat has received more study with regard to seed-borne diseases and seed treatment than has any other cereal. More than 50 different kinds of fungi or bacteria have been found on seed of wheat. Although all of these are not necessarily pathogenic, many of them may injure the sprouting seed or the young seedling.

Bunt or stinking smut is the principal disease for which seed wheat is treated. Seed-borne flag also is controlled, but both of these smuts can be carried over in the soil in some areas. Other seed-borne diseases combatted by seed treatment are anthracnose, and seedling - blight caused by species of Fusarium, Helminthosporium and bacteria. As in the case of barley and oats, the organic mercurials, such as the "Ceresans" and "Panogen," are most frequently recommended for wheat.

by
R. W. Leukel

Pathologist, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

But bunt in wheat may be controlled by a number of other materials that do not control the diseases of oats and barley mentioned above. Among these are copper carbonate, basic copper sulfate, "Arasan", "Spergon", "Phygon", sulfur, "Anticarie", and a number of other materials. The fungicide selected is chosen largely on the basis of relative cost and availability, ease of application, and lack of objectionable features.

Corn—The only diseases of corn that are prevented by seed treatment are seed rot and seedling blight. These may be caused by species of Rhizopus, Aspergillus, Penicillium, Fusarium, Diplodia, and other fungi. Plants grown from treated seed, however, frequently are stronger and more vigorous than those from untreated seed.

Many of the materials formerly used for treating seed corn are no longer on the market. The materials now recommended are "Arasan", "Spergon" and "Phygon". These may be applied either in dust or slurry form. As previously mentioned, promising results were obtained experimentally during the 1949 season with "224", a zinc mercury chromate, "640", a copper zinc chro-

mate and several other organic compounds.

Sorghum — Sorghum seed is treated largely to combat seed-rot and seedling blight, both of which are especially severe when cold, wet weather follows planting. Effective treatments also prevent the kernel smuts and the transmission of anthracnose and bacterial leaf diseases through the seed. "Arasan" at 2 ozs., and "Phygon" at 1 ounce per bushel have been found especially beneficial to emergence, while also controlling the kernel smuts in varieties in which the seed threshes free from the glumes. Sorghum seed with persistent glumes, as that of Leoti Sorgo and most broom-corn varieties, should be treated with an organic mercury like "Ceresan M" or "Panogen" if kernel smuts are to be controlled completely.

Flax—The diseases of flax transmitted by seed are wilt, browning and stem-break, anthracnose and Pasmo. Flax rust may be spread to new areas by means of small pieces of infected leaf material mixed with the seed. Proper seed treatment prevents losses from these sources to a great extent. Treatment is especially beneficial to seed with cracked or otherwise injured seed coats. Little benefit is derived from treatment of high grade flax seed free from seed coat injuries and disease fungi. The organic mercury benefits in combating diseases and improving stands. In some experiments, "Arasan" has been effective but it must be applied at a rate higher than will readily adhere to the seed.

Rice—Seed rice is treated chiefly to combat seed rot and seedling blight. The materials used for seed treatment include "Ceresan M," "Arasan," "Dow 9 B," "Phygon," "Spergon," "Cuprocide," and Tribasic copper sulfate. In general, "Ceresan M" (½ ounce) and "Arasan," "Phygon" and "Spergon" (1.5 ounce) are recommended for drilled rice, while "Cuprocide" (2 to 4 ounces) is considered best for rice sown in water, although it may injure presprouted seed. It seems that the response to different seed treatments varies with different varieties.

Treating Equipment

EQUIPMENT for treating seed with dust fungicides ranges from small home-made hand operated mixers, capable of treating about 25 bushels an hour, to large commercial outfits that can treat 500 bushels an hour.

The small home-made treaters are of two types—the rotating barrel or oil-drum "batch" type suitable for all fungicide dusts, and the small continuous or gravity type, suitable only for volatile organic mercurials. The barrel treater is easier to make but is less durable than the oil-drum treater. The barrel treater may warp or shrink so that it is not dust-tight, or may even collapse after prolonged exposure to hot dry weather.

The gravity type of treater usually does not mix the dust and grain very thoroughly and therefore is recommended for applying volatile dusts but not for dusts whose effectiveness depends on a thorough coating of the seed. The seed is put into a hopper, the proper amount of dust is added, and the two are mixed by a series of baffles as they pass down the mixing chute and into a sack. The longer the mixing chute is, provided it has a correspondingly greater number of baffles, the more thoroughly will seed and dust be mixed. Some of these treaters are provided with automatic devices for measuring and applying the proper amount of dust fungicide.

Large scale commercial treaters are generally of the gravity or auger type and range in capacity from 100 to 500 bushels per hour. They are equipped with automatic dust-feeding devices that are synchronized with the flow of the grain. These commercial treaters are usually combined with efficient seed cleaners, so that the seed is cleaned and treated in one continuous operation. Many itinerant combination cleaning and treating outfits move from farm to farm.

Treaters for applying fungicides in slurry form are somewhat expensive for the average farm. Slurry treatment, therefore, is restricted largely to seed houses, elevators or cooperative community treating centers where the large amount of seed cleaned and treated annually justifies the expense of such an installation. Most of the hybrid corn seedsmen treat their seed by the slurry method before delivering it to their customers. This form of treatment eliminates the disagreeable dust nuisance. Slurry treaters can be operated in cold weather if enough methanol antifreeze is added to the slurry to keep it from freezing.

Treating seed grain every year is a standard recommended practice, regardless of whether it is to be done by the farmer himself or by a large commercial treating outfit. Custom seed cleaning and treating is growing in popularity, because it is of great convenience to farmers, particularly when farm labor is at a premium. Farmers who depend upon custom treating, however, should make sure that the proper chemicals are being used, that they are applied at the correct rate, and that the seed and fungicide are thoroughly mixed.

It should be taken for granted that all fungicides are poisonous, that the dusts or fumes should not be inhaled, that the fungicides should not come in contact with the skin, and that the treated seed should not be used for feed or food.

Seed should be treated in a well-ventilated place, and an effective mask should be worn over the nose and mouth when using fungicides.

Information regarding the various fungicides recommended for the treatment of cereal seeds, along with instructions for applying them, are contained in United States Department of Agriculture Miscellaneous Publication 219. Copies may be obtained from the Office of Information, U. S. Department of Agriculture, Washington 25, D. C.★★

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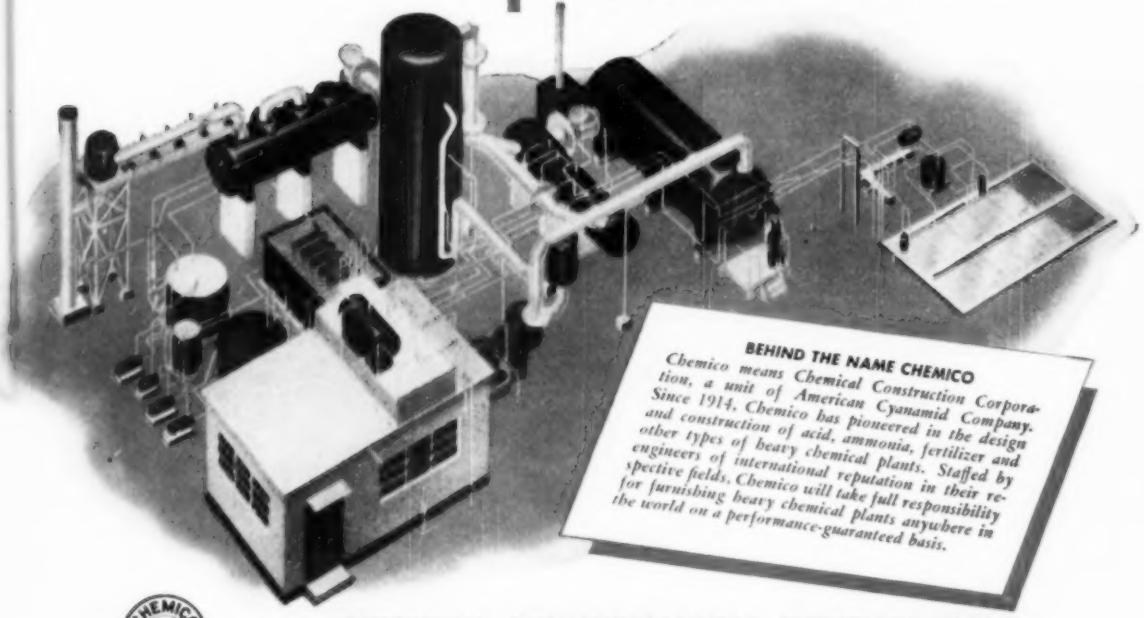

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F.D.A. Hearing Nears End; Plan to have residue tolerance rulings in hands of farmers in time for beginning of 1951 spray season. Testimony in Part "D" covers fungicides & insecticides including one systemic for controlling pests via plant juices.

Residue Hearing Nears End

WITH part "D" of the Food and Drug Administration Hearing completed, the final portion, part "E" was to begin on September 11 as scheduled by Bernard D. Levinson, presiding officer of the Hearing. The final portion is for reconsideration of the chlorine equivalent tolerance (or combined fluorine), and for the presentation of any additional spray residue data now available. Additional data on old evidence will be submitted, as will other appropriate subjects not yet covered.

Briefs were to be submitted soon after the end of the hearing and preliminary findings will be announced in perhaps six to eight weeks. These will be open for acceptance, rejection, clarification or modification, as the case may be. Later, the final findings will become law. Present plans call for the final tolerances to be in the hands of farmers in time for the 1951 spray program.

Part "D," ending on August 12, heard testimony on methoxychlor, fungicides, and a systemic insecticide. Dr. E. F. Knipling, U. S. D. A., Washington, opened the session with testimony on methoxychlor. He said that millions of dairy cattle and other livestock have received the conventional 0.5% emulsion spray applied at 3 to 4 week intervals during the 4 to 6 months when flies are active, with no adverse effect. These data, with others of similar nature, brought the conclusion that "methoxychlor is not really stored in fat of cattle treated for livestock pest control."

Dr. Harold C. Hodge, E. I. du Pont de Nemours & Co., Inc., Wilmington, said that the oral toxicity of methoxychlor is low in rats; that even after being fed diets containing 0.005 and 0.02% methoxychlor for two years, albino rats showed no toxic effects in growth, mortality, urine analysis, as compared with controls.

Dr. O. Garth Fitzhugh, F. D. A., Washington, testified that studies in the Division of Pharmacology have shown that it is difficult to obtain a true LD/50 for methoxychlor, and in the rat, the LD/50 appears to be greater than 6 grams per kilo.

Dr. Hodge returned to the stand to testify on the toxicity of "EPN" (ethyl-p-nitrophenyl thionobenzene phosphonate). He said that the acute toxic dose is of most importance to those making the application of the material to the crop. However, based upon laboratory tests with rats it was estimated that "EPN" was from 1/4 to 1/9 as toxic as parathion.

Continuing on the subject of "EPN", Dr. J. P. Frawley, F. D. A., stated that "In relation to parathion, the range was observed to be from 2 to 5 times less toxic than parathion." . . . four mgs. per day of 'EPN' could be ingested for long periods by humans, including children old enough to eat fruits and vegetables, without possibility of injury," he said.

Fungicides Scanned

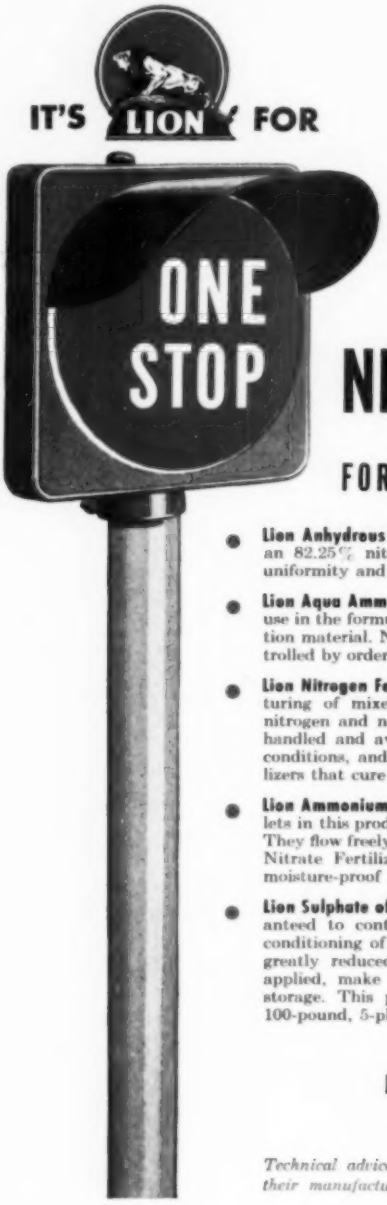
TURNING the subject to toxicity of fungicides, Dr. Bert J. Voss, F. D. A. testified on the dithiocarbamates. He reported that hyperplasia of the thyroid had been produced in rats from various intakes of the fungicide, and that "it is possible that 10 mgs. of nabam per day might depress thyroid activity in man."

Regarding zineb, he stated that his department had done no work on this material, but due to its close relationship to nabam, it was assumed that the continuous ingestion of small amounts by human beings might constitute a health hazard. Limited work has been done on ferbam in the F. D. A. laboratories, he said, and stated that the work thus far is insufficient for a conclusion as to the small amount that may constitute a health hazard. In order to be safe, one should consider it as at least as toxic as the most closely-related compounds on which data are available," he said. "If one takes nabam as a guide, it is possible that 10 mgs. of ferbam per day might not be too much for human beings." He reported that the department had done no work on ziram at all.

Dr. Voss's testimony closed with a brief report on "Thiram" (tetramethyl thiuram disulfide) in which he stated that "possibly 5 to 10 parts per million might be safe for human beings."

Continuing on the study of fungicides, Dr. J. A. Zapp, Jr., assistant director of Haskell Laboratory, testified on the toxicity of four derivatives of dithiocarbamic acid. The four included ferbam, ziram, zineb and nabam. He reported that single doses of ferbam to the extent of 2860 mgs./kilo failed to injure chicks, but that ziram is more toxic than ferbam although it acts in a similar manner.

(*Turn to Page* 94)



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The Listening Post

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Dr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

Cotton Insects

THE cotton insect situation continued critical during the last half of July and early August. Reports of inadequate supplies of insecticides needed for cotton insect control continued to be received from most areas. Interested agencies, including industry, were doing everything possible to secure additional supplies of raw materials in order to help make available to the farmer increased supplies of finished insecticides where needed. Cotton growers were being urged to use insecticides wisely in order to prevent waste, and to avoid crop losses by adjusting their needs to the recommended materials that can be secured.

The weather favored boll weevil activity during the last half of July in many areas. Rather frequent and locally heavy rains in the northern and eastern Cotton Belt resulted in rapid growth of the crop with the cotton becoming rank in places, increased weevil activity, and hampered or reduced the effectiveness of insect control measures. There was less rain in the southern belt, which made possible better control of the weevils.

The cotton leafworm has continued to spread rapidly and by the end of the first week in August had been reported from at least 110 counties in Texas, 33 in Oklahoma, 4 in New Mexico, 1 in Arizona, 9 in Arkansas, 1 in Mississippi, and from 12 parishes in Louisiana. In southern Texas many fields have been defoliated by this insect. Infestations were reported to be heavy in many north central and western parts of the State, and the pest was becoming more numerous in northern counties.

Grasshoppers

FARMERS in southwestern North Dakota continued to apply large quantities of toxaphene and chlordane sprays during the last half of July and early August to control grasshopper infestations that were causing crop damage. Farmer spraying activity also increased in the northwestern quarter and in the extreme northeastern and southeastern corners of the state. Spraying organic insecticides was increasing in north-central Montana, where hoppers were moving into small grains. In north and west-central Texas, grasshopper control by farmers declined as the hoppers, practically all in the adult stage, moved out of the fields into marginal vegetation which had greened following rains.

The most widespread and intensive grasshopper infestations noted in California this year were reported during the last half of July from Humboldt County. About one-half million acres of mountain slope grazing lands were heavily infested. Some areas were damaged so severely that the slopes looked as if they had been burned off. Reports early in August indicated that landowners in the area were baiting hundreds of acres of valuable grazing lands by airplane.

The cooperative State and Federal grasshopper control program on range areas in Wyoming drew to a close early in August. Through the end of July around 2 million acres had been baited by aircraft.

European Corn Borer

REPORTS from Iowa indicate that second generation borers are not likely to be much of a problem there. Most of the first generation larvae evidently will not pupate and produce moths to lay eggs for a second generation. Such second generation borers as may occur will be so late that the midseason and late corn may not need insecticide treatment.

In Illinois, although development of the borer has been delayed as a result of continued low temperatures, State workers expect a serious second generation infestation in medium and late planted corn, and possible need of treating some midseason and late fields, especially in the western part of the state. A fair flight of the moths that give rise to the second generation borers was underway the first week of August in southern Illinois and a few moths had emerged as far north as Peoria.

Fruit Insects

CODLING moth larvae of the second generation began entering apples in southern Indiana and southern Illinois around the middle of July and by the end of the month entrances by larvae of that generation were reported from most areas. Activity continued light, but increased somewhat in New Jersey, southern Illinois, and Missouri early in August.

Infestations of the red-banded leaf roller, mostly second brood, continued light in most areas from which they were reported, but increased slightly in southern Indiana, southern Illinois, and Missouri early in August.

European red mite populations continued to increase throughout fruit-growing districts of the East during the last half of July, but showed some decrease in southern Indiana and southern Illinois during the first week of August. This pest was reported to be less abundant than usual in the Yakima Valley of Washington during the latter part of July. Populations of the two-spotted spider mite showed some increase in fruit growing areas of Massachusetts, New York, western Maryland, southern Indiana, southern Illinois, and Missouri.

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Vegetable Insects

MEXICAN bean beetle infestations continued in moderate to heavy intensity during late July and early August throughout most Atlantic Coast and Gulf districts and in Tennessee. The degree of infestation appeared to be decreasing, however, in some areas. Lighter infestations prevailed in Ohio, Nebraska, Colorado, and Wyoming. In northern Utah, infestations were of sufficient intensity to require insecticide applications. Potato leafhopper infestations varied from light to heavy on beans in New York, Maryland, Virginia, North Carolina, Tennessee, and Ohio.

Cabbage caterpillars continued abundant on various cole crops in all of the eastern and southern districts reporting, as well as in Tennessee, Nebraska, and Idaho. Aphids were numerous on some cole crops in Washington during the last half of July. Severe infestations of the southern green stink bug occurred on crucifers in Georgia and Florida.

Pea aphid infestations on peas appeared to be decreasing in most areas reporting. Aphids showed a sharp increase on potatoes in Maine during the last half of July. Aphids were also numerous on tomato in parts of New York, Maryland, and Minnesota. Moderate to heavy infestations of the onion thrips were reported on onions in New York, Maryland, Tennessee, Wisconsin, Idaho, and Utah.

Testing Fungicides for Scab Diseases

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

DONALD J. deZeeuw and John R. Vaughn, of the Michigan Agricultural Experiment Station, report results of one year's preliminary tests with the antibiotic cycloheximide as compared with some other chemicals for the control of cucumber scab. They emphasize that these 1949 experiments were on a small scale and that the same results might not be obtained in further tests; however, the fungus that causes the disease, *Cladosporium cucumerinum*, is difficult to control once it gets started, and any significant degree of control by any fungicide is of potential value. The antibiotic is prepared by the Upjohn Company under the proprietary name "Acti-dione."

The experimental plots consisted of single rows 80 feet long randomized by treatment and replicated four times. The sprays (Table 1) were applied in 7 applications at approximately 7- to 10-day intervals from July 7 to September 1, at the rate of 75 to 125 gal. per acre, depending on vine size. A spore suspension of the fungus was sprayed on the foliage July 5 and 18 and August 4. By the beginning of the eighth picking (Aug. 22) the scab epidemic had begun; it developed rapidly and continued severe through the remaining four pickings. Yield data were taken on total weight of fruit, weight of cull fruit, and weight of scabby fruit. From these data were calculated the percentages of scabby fruit in relation to total yield and in relation to the yield of the last five pickings. All of the scabby fruit was harvested in the last five pickings, and none was found in earlier pickings (Table 1).

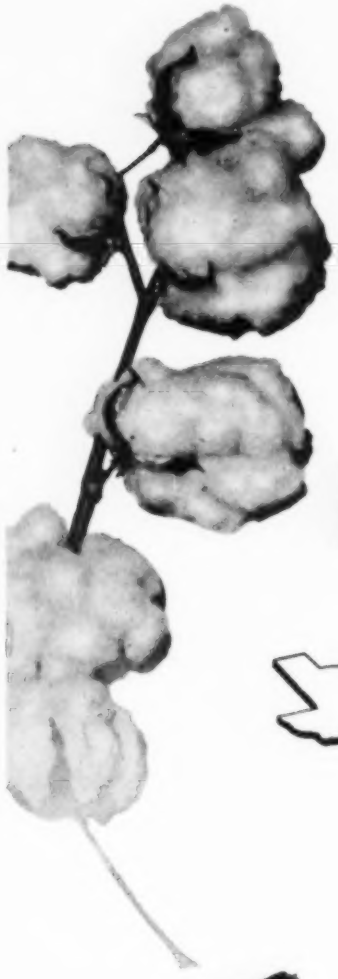
It was apparent, almost as soon as scab appeared, that fewer cucumbers had to be culled from rows sprayed with cycloheximide and several other fungicides than from the control rows. As the epidemic increased in severity with cooler weather, the total amount of culls increased in all rows, but a margin of benefit remained in the sprayed rows; not only were there more non-infected cucumbers, but spots on the infected fruits were somewhat smaller and fewer. The latter factor does not appear in the statistical analysis of data, since all cucumbers with scab spots were classed alike, but it does strengthen the conclusions formed from subsequent analysis.

It will be noted in Table 1 that the fungicides are ranked in the order of their apparent efficacy in scab control. The data, expressed in percentages, are naturally subject to certain mathematical errors, but when converted to degrees by a standard method the results agreed closely with

TABLE 1
Cycloheximide as a cucumber scab fungicide—Michigan 1949.

Fungicide and strength used	Total lbs.	Yield of last 5 pickings lbs.	Scabby[a] lbs.	Percentage of scabby fruit	
				Total percent	Last 5 pickings percent
Cycloheximide 10 p.p.m.	187.6	90.2	24.9	13.1**	27.1**
"Crag 658" 2 lbs./100 gal.	212.0	100.8	31.2	14.6*	30.8*
Tribasic copper sulfate 3 lbs./100 gal.	181.0	86.4	28.6	15.8*	33.6*
"Dithane Z-78" 2 lbs./100 gal.	220.6	106.7	35.6	16.3	33.1*
"Zerlate" 2 lbs./100 gal.	198.6	92.8	39.3	19.6	41.7
Control no fungicide	201.2	87.6	38.1	19.5	42.8

*Significantly less scab than control, **Very significantly less scab.
[a]All scabby fruit in the last five pickings, earlier pickings free from visibly scabby fruit.



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TO HELP MEET the tremendous demands of agriculture — both domestic and foreign — commercial production of Kolker BHC (Benzene Hexachloride) is now available from our new Houston plant.

KOLKER BHC is produced in the popular 36% technical and 12% concentrate grades, offering exceptional ease of formulation to insecticide manufacturers. They are made to the same rigid quality standards that characterize all Kolker chemicals, including DDT, 2,4-D and 2,4,5-T.

STRATEGICALLY LOCATED in the agricultural South, near rail, truck and ship terminals, the new Kolker plant is ready to meet your 1951 BHC requirements. Write, wire or phone today for prices, literature, delivery dates!

Kolker BHC

★36% technical

★12% dust concentrates

★12% wettable powder

Kolker Chemical Works Inc.

80 LISTER AVENUE, NEWARK 5, N. J.

Basic Agricultural Chemicals of Quality

TABLE 2
Control of damping-off of peas with 8-quinolinol compunds[a].

Material	Dosage per 940 grams of soil	Percent Emergence
8-quinolinol benzoate	1 gram	84
do.	2 grams	92
do.	4 grams	72
do.	6 grams	64
8-quinolinol sulfate	1 gram	20
do.	2 grams	84
do.	4 grams	84
do.	6 grams	24
Check	....	4
Check	....	0

[a]Twenty five seeds planted per pot; final data taken 15 days after planting. Naturally-infested soil, with both *Pythium* and *Rhizoctonia* present.

the analysis by percentage. Part of the reduction in percentage of scab might be due to decreased total yield in some rows. Cycloheximide and tribasic copper sulfate, for instance, had comparatively low total yields along with their low percentages of scabby fruit, but the control and "Zerlate" rows with only slightly larger total yields had disproportionately high percentages of scab. The "Crag 658" and "Dithane Z-78" rows with the higher total yields had relatively low percentages of scabby fruit.

According to the data and to field observations, "Zerlate" did not control scab, even though it was one of the more promising fungicides against other diseases of cucurbits in the preceding year's tests.

8-Quinolinol Tested

E. M. STODDARD of the Connecticut Agricultural Experiment Station and G. A. Zentmyer of the University of California state that for a number of years, 8-quinolinol compounds have been used at the former institution for the control of damping-off of seedlings in the routine of growing experimental plants, a practice started as the result of trials of various materials that showed promise in chemo-therapy tests on other diseases.

According to them, the use of 8-quinolinol and its derivatives introduces a new series of chemicals into the field of damping-off control. In greenhouse experiments with these materials, control of both pre- and post-emergence damping-off has been obtained with 8-quinolinol and its benzoate and sulfate salts. Trials have been conducted with spinach, peas, eggplant, lettuce, petunias, snapdragons, celery, tomatoes, and elms.

They summarize results of experiments for control of pre-emergence damping-off of peas as indicative of the striking results with these materials (Table 2). Three other tests with peas gave closely similar results. In these tests the dry chemicals were mixed with the soil in spots before planting the seed.

In the test reported in Table 2, as in several others, there was indication of chemical injury at the higher dosage levels, manifested in retarded rate of emergence, in lower total emergence, and occasionally in slight chlorosis of leaves when solutions were applied to seedlings following emergence.

Trials with lettuce, spinach, petunia, snapdragon, and celery seedlings have shown that the 8-quinolinol materials are definitely useful for the control of post-emergence damping-off also, when applied to seedlings in aqueous solutions.

TABLE 3
Foliage scab on apples, Rome variety; West Dover, Delaware—1950.

Treatment[a]	Conc. per 100 gal.	Percent foliage scab
1. Untreated	.....	45.0
2. Magnetic 70 paste type sulfur[b]	8 lbs	8.5
3. Magnetic 70 paste type sulfur + NuGreen[c]	4 lbs + 5 lbs	0.7

[a]Applications: Delayed Dormant, Pre-Pink, Pink, Full Pink, Bloom and Petal Fall.
[b]Used at all applications.
[c]Magnetic 70 (8 lbs-100) only at Delayed Dormant, Pre-Pink, and Bloom. Magnetic 70 + NuGreen (4 lbs + 5 lbs - 100) at Pink, Full Pink, and Petal Fall.

Apple Scab Control

IN a compound evaluation test for control of apple scab on the Rome variety at West Dover, Delaware, reported by P. L. Poulos and J. W. Heuberger of the University of Delaware, "Magnetic 70" paste type sulfur + "NuGreen," which contains urea, showed promise as an effective fungicide-plant food combination for the control of scab. Primary infection data on foliage were taken June 9. Results are shown in Table 3.

These data are said to be in accord with those reported from the Connecticut Agricultural Experiment Station previously.★★

•

Mayeux Joins Fla. Co.

Herman S. Mayeux, former extension entomologist in the Lower Rio Grande Valley, Texas A & M College, has been appointed technical advisor on all products and product development work for the Florida Agricultural Supply Company, Jacksonville, a division of the Wilson & Toomer Fertilizer Company.

A native of Louisiana, Mr. Mayeux earned both his Bachelor of Science and Master of Science Degrees in entomology at Louisiana State University. He also carried a research fellowship at Louisiana State in agricultural entomological work.

•

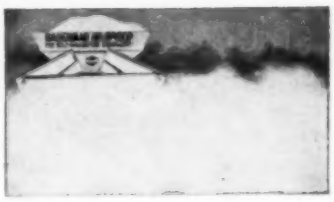
Ia. State Fertilizer Meet.

The fourth annual Iowa State Fertilizer Conference will be held at Ames on December 12-14, according to George Stanford, Associate Professor of Agronomy at I.S.C. The first day will be devoted to a conference with fertilizer manufacturers, and dealers' conferences will be held on the final two days.

Baughman

Holds the spread to the ground!

Baughman's new principle (above) contrasts sharply with the ordinary method (right). The direction control of the Model 235 Attachment assures minimum waste in spreading expensive fertilizers.



MODEL 235 FERTILIZER SPRAYER ATTACHMENT MAKES IT LAY AND STICK

For Baughman K, K-2 and K-3 Bodies. Prevents wind from scattering lime and phosphate spreads. Confines air blast from whirling distributor and directs spreading materials outward and groundward. Causes the spread to LAY and STICK. Spreads limestone up to 30 feet . . . phosphate and other fertilizers up to 20 feet.

Folds to 8 feet easily and solidly for highway travel. Open (to 18 feet) and ready for work in a jiffy. Ruggedly built of 13 gauge alloy steel . . . heavy re-inforced hinges. No moving parts . . . all parts replaceable. Heavy combination canvas and rubber curtain. Nothing like it on the market . . . *WRITE FOR FULL INFORMATION.*

CUT COSTS . . . INCREASE PROFITS with BAUGHMAN Customized EQUIPMENT

MODEL Q SCREW CONVEYOR loads and unloads from the horizontal to 50°. Capacity up to 40 bu. per minute. Big 9" conveyor screw handles any dry, powdered or granular materials. Available with or without wheels—hundreds of applications.

BELT and BUCKET ELEVATOR . . . stores in bulk . . . delivers in bulk . . . eliminates bagging. The most efficient way to handle commercial fertilizers. *LOW COST* because it's assembled from standard size sections, eliminating the cost of a custom-built installation.

WRITE FOR COMPLETE DETAILS
of Baughman fertilizer handling and spreading equipment.

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191 SHIPMAN ROAD, JERSEYVILLE, ILLINOIS
"The Pioneers of the Fertilizer Spreading Industry"

Technical Briefs

Control of May Beetles

Ten species of May beetles were found in the Inner Bluegrass Region of Kentucky. *Phyllophaga hirticula* (Knoch) was the most abundant and the main injurious species, often stripping oak and walnut trees of their leaves late in April or early in May. Factors associated with severe defoliation were a large flight of *Ph. hirticula*; small, tender foliage; warm weather; and a small number of preferred host plants surrounded by large areas of grub-infested sodland. The various species of May beetles have a definite sequence of emergence which makes it possible to time spraying operations by following the flight of the different kinds. *Ph. tristis, Ph. fusca,* and *Ph. Inversa* emerge on the first warm evenings in April but cause little damage. The destructive species *Ph. hirticula* does not appear until late April or early May, by which time flight of *Ph. tristis* is on the wane. *Ph. horni* and *Ph. kentuckiana* are late appearing species. Lead arsenate, chlordane, and parathion were effective spray materials. Results with DDT were rather erratic but had the advantage, like lead arsenate and parathion, that beetles fed sparingly on treated foliage.

—Bulletin 542, Kentucky Agri. Exp. Station.

•

Find "Western X" Carrier

A leafhopper, *Colladonus geminatus*, has been shown by U. S. D. A. and Oregon State Experiment Station entomologists to carry the virus causing "Western X" disease of peach trees. One such insect has been found to carry an amount of virus sufficient to infect a healthy tree.

The disease itself affects peach production in several far western states. It is especially injurious in orchards in parts of Utah and Washington. The same virus causes diseases of cherry which are equally as serious or even more so. The Bureau of Entomology and Plant Quarantine and the Oregon Agricultural Experiment Station, have started cooperative experiments to see if the spread of one of these cherry diseases caused by the Western X virus can be prevented or retarded through the use of insecticides to kill the leafhopper carriers. In addition, the host relationships of the vector are being studied by the Tree Fruit Experiment Station, Wenatchee, and by U. S. D. A. workers.

The studies which led to the discovery of a leafhopper carrier of Western X disease, were made at Wenatchee, Wash., and The Dalles, Oregon, under funds provided by State agencies and by the Research and Marketing Act. Cooperating plant pathologists provided diseased trees for the tests.

Symposium on Use & Effectiveness of Allethrin

A roundup of recent information dealing with the handling, use, effectiveness and toxicity of allethrin was presented in the August issue of *Soap And Sanitary Chemicals*. Contributing to the symposium were Dr. R. W. McNamee, Carbide & Carbon Chemicals Division, Union Carbide & Carbon Corp., New York; Dr. J. B. Moore, McLaughlin Gormley King, Minneapolis; Donald F. Starr and Paul Ferguson, S. B. Penick & Co., N. Y.; T. N. Salmon, Hunter College, New York; and Howard A. Jones, H. O. Schroeder and H. H. Incho, U. S. Industrial Chemicals, Inc., New York. The symposium was heard at the recent meeting of the Chemical Specialties Manufacturers' Association in Chicago.

Discussing the general nature of allethrin, Dr. McNamee pointed out that the material is a relatively pure substance since it is not an extract of a natural product and does not contain a "multiplicity of extraneous and nondescript properties." However, a small quantity of simpler chemical is contained, and this interferes with some of the chemical determinations and tends to vitiate the quantitative results of analyses. "Thus it is incumbent upon (manufacturers) to do one or both of the following:

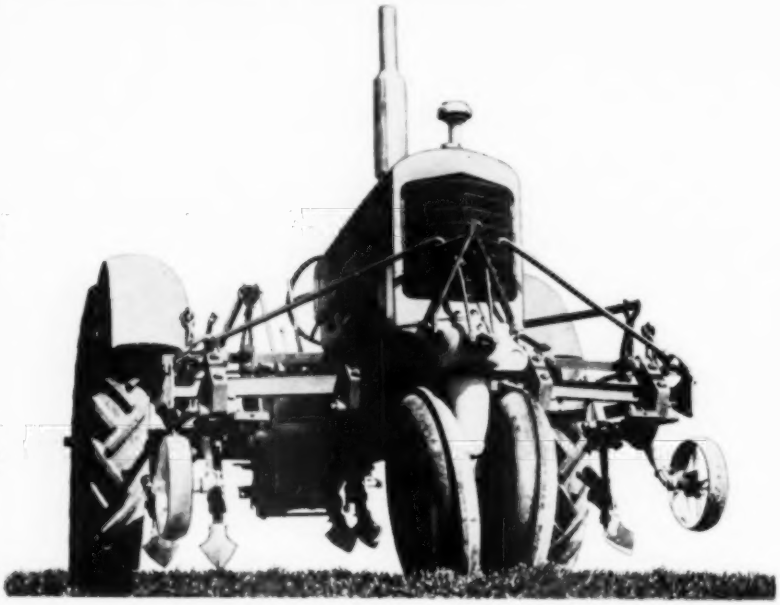
"1.) Produce a material containing so little of the impurities that the chemical methods can be applied without regard for the interfering materials. This is not necessarily impractical.

"2.) Characterize the impurities precisely so that they can be determined quantitatively in order to arrive at the proper assay of a sample of allyl cinerin. This we are doing."

Describing the material specifically, Dr. McNamee stated that it is a clear liquid with a specific gravity of 1.0005 at 20°C. and a refractive index of 1.5040 at 20°C. It is completely miscible with petroleum distillates ordinarily employed in the formulation of insecticidal sprays. The color of the solution is very light. Less than 0.1 per cent of this product is insoluble in the "Freon" used in aerosols. Moreover, it stays that way in storage and does not develop polymers and gunks which clog orifices."

The standardization, analysis and storage of allethrin were discussed by Dr. Moore who stated that the currently-used methods of analysis for standardization of pyrethrum products can be used in the analysis of allethrin even though we know they are not perfect. At first it would seem that the Seil and mercury reduction methods should give better and more reliable results with allethrin which is supposed to be a pure chemical than with the natural product, which is well known to be composed of four biologically active constituents. ***The Seil method will give values for biologically active material that are slightly too high just by the few per cent of free acid present in allethrin. For this same reason we have suspended working on the method using absorption of iodine, although we had determined already that only the unsaturated linkage in

FARM PORTRAIT NO. 9



Mechanization is reshaping the American farm.

Reg. U. S. Pat. Off.

HIGRADE MURIATE OF POTASH
62/63% K_2O
GRANULAR MURIATE OF POTASH
50/52% K_2O
MANURE SALTS 20% MIN. K_2O

In the past century, mechanization has wrought far greater changes on the farm than ever took place before in recorded history. What the next century will bring to agriculture, no one can imagine—but the advances promise to be tremendous.

In these advances, an important part will be played through the rapidly increasing use of chemical fertilizers. Many of these are compounded with potash—often with Sunshine State Potash, a product of New Mexico. For this natural soil nutrient increases soil fertility, and builds up greater resistance to plant diseases and drought.

UNITED STATES POTASH COMPANY, *Incorporated*, 30 Rockefeller Plaza, New York 20, N. Y.

the acid radical and that in the allyl chain of the cinerolone react. The double linkage in the nucleus of the cinerolone, however, does not react with the iodine. It was originally hoped that this method would avoid the long time required by the Seil method. ***We believe that less time consuming methods may eventually be developed to give a reasonably satisfactory analysis. ***There still remains a lot of work to be done in eliminating all possible sources of error in this method and we are not yet ready to give any particulars but will inform all interested parties as soon as we have finished.

"The standardization of allethrin, therefore, will have to wait the adoption of an accurate reproducible analytical method.***"

"The storage requirements for allethrin do not seem particularly strenuous after our experience with pyrethrins. ***We have run a series of tests with pyrethins and allethrin at comparable concentrations. The results of these tests indicate that at high concentrations, allethrin is somewhat more stable than pyrethrins. Very dilute solutions, such as two per cent solutions, have shown about equal stability.

"We feel that the definition of allethrin should mean 100 per cent material or 100 per cent allyl analog of cinerin I. Then all concentrations of allethrin, whether it be in fly sprays, agricultural dusts or aerosols, could be stated as so many per cent allethrin in the same manner as the labeling of pyrethrin formulations."

A report of how allethrin acts with synergists was presented in the paper by Drs. Jones, Schroeder and Incho. The comparative effectiveness of allethrin and pyrethrins with synergists varies with the synergist used, the insect species, the mode of application and other factors, it was pointed out. In general, combinations of allethrin with synergists show a lower order of insecticidal effectiveness than similar combinations of pyrethrins with synergists. Allethrin must be regarded and studied as a new insecticide and no predictions of its usefulness should be made on the basis of previous results with natural pyrethrins.

In tests against houseflies, compared to the LD/50 obtained with pyrethrins and synergists, somewhat less than twice the amount of allethrin with sesame oil extractives was required to obtain the results noted with the same synergist and pyrethrins. With n-propyl isome, the amount was about twice; and with piperonyl butoxide, over twice as much. Synergist "264" appeared to be almost equally as effective with allethrin as with pyrethrins at the 50 percent mortality level, although the tests indicated that at higher mortalities, definitely more of the allethrin combination would be required.

"While exact comparisons between the synergists on the basis of the data presented are not entirely justified, it is . . . quite apparent that a consideration of the actual concentration required to produce 50 percent mortality would place the four synergists in an entirely different order of usefulness than would be indicated by a consideration of only the relative amounts required," the authors declared.

Against other insects such as grain insects (confused flour beetle and the rice weevil), surface deposits of allethrin with piperonyl butoxide may be less than one-third as effective as those of pyrethrins and piperonyl butoxide. In dusts against certain truck crop insects a combination of allethrin with piperonyl cyclonene was generally less effective than that of pyrethrins with piperonyl cyclonenes, but the differences in effectiveness varied greatly with the insect species. For example, against Mexican bean beetle adults and larvae the allethrin-cyclonene dust gave almost the same mortality as the pyrethrins-cyclonene dust, while against squash bug adults and nymphs the allethrin combination was much less effective than the pyrethrins combination.

Regarding the toxicity of allethrin to laboratory rats, Dr. Starr pointed out that the evidence indicates that both new-born and adult rats can tolerate allethrin over long periods of time in amounts of about 100 times that which would be encountered by normal insecticide usage. So far there has been no indication that combinations of allethrin with other insecticide materials such as DDT or the synergists, "Isome" or "Sulfox-cide" present any unexpected problems. The most extreme misuse of allethrin aerosol bombs has not killed any of the exposed rats, Dr. Starr concluded.

Data comparing the effectiveness of allethrin with pryethrins on specific insects were given by Dr. Nash. His results showed that allethrin is almost, but not quite the equivalent of natural pyrethrins against houseflies; at low concentration allethrin is less effective, while at high concentrations it is more effective; 1.0 per cent allethrin resulted in a better 10 minute knockdown figure, and equal or better, 24 hour kill results than the same percentage of pyrethrins in aerosols; double the concentration of allethrin is required by the direct spray method to equal the knockdown and kill obtained by pyrethrins against German roaches; by the settling mist method allethrin is nearly equal to pyrethrins in terms of knockdown and kill of German roaches at concentration of .10 and .20 per cent; two to four times as much allethrin in oil sprays to obtain the same kill of American roaches by the direct spray method or the settling mist method; residue from allethrin is superior to that of natural pyrethrins against houseflies.

•

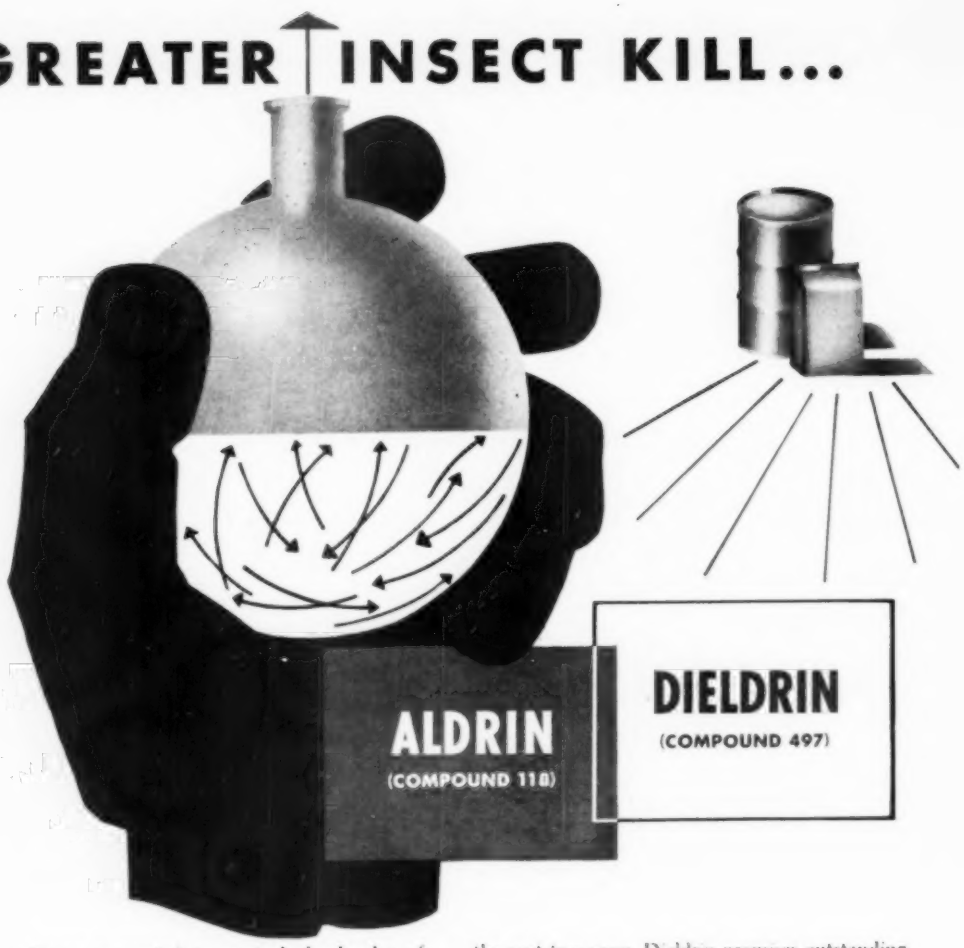
Spray Protects Tomatoes

Equal molar solutions of sucrose mixed with urea solutions stopped urea burning in all cases and enabled ten times as much urea to be used on tomatoes without burning as when no sucrose was used; namely, 50 lb. instead of 5 lbs. to 100 gallons.

Sucrose spraying increased the sucrose in the extracts of both leaves and fruits. Quality and taste of the fruits on the sucrose-sprayed plants were much better.

The effect of sucrose spraying on yields is yet to be determined. —Bulletin 550, Kentucky Agri. Experi. Station. May, 1950.

GREATER INSECT KILL...



Power is needed to control the hordes of resistant and destructive insects that this year threaten to take a two-billion dollar bite out of America's food and fiber production. Aldrin and Dieldrin have this power in abundance; effective dosages of Aldrin and Dieldrin are computed in ounces of the chemical per acre . . . not in pounds. This low-dosage, high-kill efficiency spells greater economy, low-cost insect control to the ultimate user.

Aldrin has been widely used this year for control of **grasshoppers, boll weevil** and other cotton insects. Successful large scale experimental field work in control of **soil pests** indicates extended markets next year for Aldrin.

Based on extensive experimental use during the past two years, Dieldrin promises outstanding performance in control of **flies, mosquitoes, ants and termites** as well as certain agricultural insects where long residual action is both desirable and practical. Dieldrin will be in commercial production early in 1951.

ALDRIN and DIELDRIN were discovered and developed in the Research Laboratories of Julius Hyman & Company.

Your request for information about these chemicals will be given prompt attention. Available on request are: Circular Nos. 400, Control of Cotton Insects with Aldrin; 401, General Information on Aldrin; 402, Control of Grasshoppers with Aldrin; and the 1949 Entomological Reports for Aldrin and Dieldrin.

Julius HYMAN & Company
DENVER, COLORADO

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Suppliers' Bulletins

Offers Emulsifier Data

H. L. Woudhuysen & Associates, 17 Battery Place, New York 4, have issued a descriptive bulletin on their product, "HLW Emulgates," emulsifying concentrates for use in insecticides, fungicides and other agricultural chemical formulations. The booklet describes in detail the uses of the material in various combinations with pesticides. Copies are available from the company.

•

Warfarin Product Described

A new 24-page booklet describing its rodenticide product "Dethmor," has been issued by S. B. Penick & Co., New York. The product, based on warfarin, is described in detail, covering its chemical makeup, its effect on rats and mice, and reports of various field tests with the material. Formulations and directions for use are also given in detail. The booklet is available from S. B. Penick & Co., Insecticide Division, 50 Church St., New York 7, N. Y.

•

Offers Diluent Brochure

California Industrial Minerals Co., Friant, Calif., has announced the marketing of a new diluent, "Friantite TP," designed especially for use in compounding a tetraethyl pyrophosphate dust. Use of the diluent, the company says, permits a 4% liquid impregnation without effect upon the free-flowing characteristics of the diluent. Full descriptive literature on the product is available from the company.

•

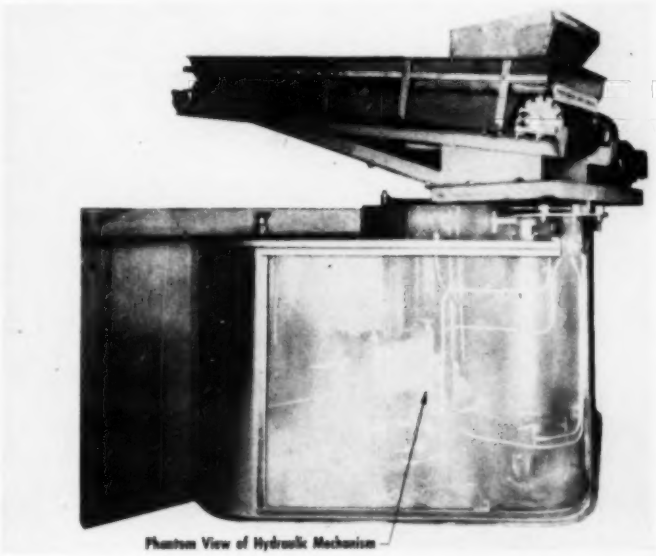
Printed Tape Described

Fisher Scientific Co., Pittsburgh, Pa., has announced a new cellulose tape, printed in vivid colors with the words "Poison," "Corrosive" and "Flammable" which is now available in convenient roll form with a heavy cast dispenser. The tape, ½ inch wide, is recommended as a safety precaution for marking all reagent bottles, packages, etc., handled by individual workers. Each roll contains approximately 200 printed portions, each of which is about 3½ inches long. Literature is available from the company, 717 Forbes Street, Pittsburgh 19, Penna.

•

Hydraulic Feeder Offered

Proctor & Schwartz, Inc., Philadelphia, have marketed a new hydraulically-powered oscillating feed for the uniform distribution of loose material on any wide conveyor. The makers claim that the hydraulic power gives simple and accurate control of the speed and travel of oscillation, permitting smooth reversal at controlled rates. This makes it possible to load an even bed of material on the main conveyor from the feed conveyor with a uniform density of load from side to side and along the length of travel of the main conveyor. Complete information is available from the manufacturers, 7th St. & Tabor Rd., Philadelphia 20, Pa. (See picture below)



Phantom View of Hydraulic Mechanism

New Fumi. Applicator Rig

American Cyanamid Co., New York, has prepared a new bulletin describing a new improved type of applicator for "Cyanogas", for use in fumigating grain in storage. The device was developed by Cyanamid engineers to eliminate difficulty in connection with placing drums of fumigant on table-type applicators over a moving conveyor belt. The new method makes use of a stand assembly upon which the drums hang so that the contents will be applied to grain on the conveyor belt. Full information is available from American Cyanamid Co., Agri. Chemicals Div., 30 Rockefeller Plaza, New York 20.

•

Antara Booklet Out

Antara Products, subsidiary of General Aniline & Film Corp., New York, have published an eight page brochure on their "Surfactants" products, describing the materials which are used as detergents, wetting agents and emulsifiers. Among the uses listed are those of wetting and dispersing agents for wettable DDT, pyrenone insecticides and as emulsifiers for 2,4-D esters.

V-C

V-C fertilizers

Complete Fertilizers Superphosphate
Concentrated Superphosphate
Phospho Plaster Sulphuric Acid

V-C phosphate rock products

Phosphate Rock, *Ground and Unground*
Calcined Phosphate Rock Nodulized Phosphatic Materials

V-C cleansers

The Vicar® Line of Cleansers

V-C fibers

Vicara® Textile Fibers
Zycon Fibers

V-C bags

Burlap Bags Cotton Bags
Paper Bags

V-C chemicals

Phosphorus
Phosphoric Acids
Technical Grade
85% N. F. Grade
75% Food Grade
62½% Commercial Grade

Sodium Phosphates
Disodium Phosphate (Technical and Drug Grades)
Trisodium Phosphate
Tetrasodium Pyrophosphate
Sodium Tripolyphosphate

Calcium Phosphates
Monocalcium Phosphate
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PEST CONTROL PRODUCTS

Black Leaf 40—for spraying fruits, vegetables and flowers, to control aphids and similar sucking insects. Also used to control certain external parasites of cattle, sheep, and poultry—and as a drench for sheep.

Black Leaf Dry Concentrate—a dry powdered nicotine compound that combines the versatility of Black Leaf 40 with the convenience of a dry product.

Black Leaf 155—a "fixed" nicotine compound for spraying apples and pears to control codling moth, also for controlling grape berry moth and citrus thrips.

Black Leaf 10 Dust Base—a "free" nicotine compound, easy to mix with non-alkaline carriers to make a neutral dust.

Black Leaf Garden Dust—a multi-purpose dust or spray containing nicotine, pyrethrum and rotenone—*plus* a concentrated fungicide.

Black Leaf Rotenone Dust—1% rotenone and sulphur, blended on our special carrier material.

Black Leaf Mash-Nic—for controlling the large roundworm (*Ascaridia galli*) in chickens. A "single-shot" treatment.

Nico-Fume Liquid—contains 40% actual nicotine in a "free" form—for greenhouse spraying and fumigating to control aphids and similar sucking insects.

Nico-Fume Pressure-Fumigator—spreads penetrating nicotine fumes under pressure to control aphids and similar sucking insects in the greenhouse.

Benzo-Fume Pressure-Fumigator—for the control of greenhouse red spider mites.

Black Leaf Aerosol Insect Killer—a highly effective aerosol insecticide containing a combination of pyrethrins and piperonyl butoxide. Controls flies, mosquitoes, ants, roaches and similar household insect pests.

Black Leaf 3-5-40 Cotton Dust • Black Leaf 3-5-0 Cotton Dust
Black Leaf Toxaphene-Sulphur Dust • Black Leaf Toxaphene Dust
—for control of boll weevils, aphids, fleahoppers, thrips, boll worms, and certain other insects infesting cotton.

Other cotton insecticide materials available.

"Black Leaf"®

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Richmond, Virginia • San Francisco, California

INDUSTRY NEWS

Smith New Powell President

H. Alvin Smith, executive vice-president of John Powell & Co., Inc., New York, manufacturers of

H. ALVIN SMITH

agricultural chemicals and insecticides, was elected president of the company at a recent meeting of the board of directors. Other advancements in the firm have also been announced. W. J. Pollert, vice-president, previously in charge of production, was put in complete charge of all operations. Dr. Alfred Weed, who headed domestic sales, is now director of sales and promotion.

Mr. Smith is a graduate of New York University. He joined the Powell organization in 1941, became treasurer in 1943 and vice-president in 1945. When Mr. Powell resigned in 1948, Mr. Smith was appointed chief executive.

Since then the company has embarked upon a progressive program to expand its services. Early this year new facilities were originated and constructed at Huntsville, Alabama, and a network of coast-to-coast stocking points established.

Powell is one of the few old-line companies which has adhered to a policy of selling only to independents. It was one of the few originators and is presently a leading supplier of safe botanical insecticides, such as pyrethrum and rotenone. The company was a pioneer in the aerosol program and a large supplier of aerosol concentrates during World War II.

•

New Industry Committee

A six-man committee has been named by the National Agricultural Chemicals Association to act as liaison between the industry and Government, to keep in close touch with developments in Washington which have to do with possible allocations of materials. The committee, headed by John Rodda, U. S. Industrial Chemicals, Inc., New York, will "live with" developments in the capital, and will act in an advisory capacity for the industry.

As previously announced, the U. S. Department of Commerce will be in charge of allocations if any become necessary. President Truman has indicated that there will be no temporary organizations to take care of industry allocations if the international situation worsens, but that established Government agencies will handle this work. The industry committee will therefore keep in close touch with both the U. S. Department of Agriculture and the U. S. Department of Commerce, the latter having the responsibility of making up allocation schedules when and if necessary.

In addition to chairman Rodda, the committee is composed of John Paul Jones, Stauffer Chemical Co., New York; Arthur W. Mohr, California Spray Chemical Corporation, Richmond, Calif.; Ernest Hart, president of Niagara Sprayer Division of Food Machinery Corp., Middleport, N. Y., and president of the N. A. C. Association; George F. Leonard, executive vice-president of Tobacco By-Products & Chemical Corp., Richmond, Va., and former N.A.C. president; and Lea S. Hitchner, Washington, D. C., executive secretary and treasurer of the N.A.C. Association.

Hunter to Barrett Div.

Malcolm E. Hunter has been appointed sales manager of direct application nitrogen materials of The

MALCOLM E. HUNTER

Barrett Division, Allied Chemical & Dye Corporation. Mr. Hunter is a native of South Carolina and is well known in the fertilizer industry. He recently resigned as General Sales Manager of the Fertilizer Division of Virginia-Carolina Chemical Corporation, after serving in the Sales Department of that Corporation for 28 years. In his new connection, Mr. Hunter is in charge of sales of nitrate of soda, "A-N-L," and other Barrett nitrogen fertilizer materials.

•

ACS Meeting in Chicago

September 4, 5 & 6 were the dates set for the division of Fertilizer Chemistry of the American Chemical Society. The meeting, scheduled for Chicago, was to be in charge of Drs. Vincent Sauchelli, and S. F. Thornton, chairman and secretary of the Division, respectively.

As announced previously, speakers whose names appeared on the advance program included W. H. MacIntyre; Jackson B. Hester; Emil Truog; W. H. Colwell; J. C. Rinehart; J. G. Sedrow; Firmen E. Bear; A. L. Mehring; T. P. Hignett; G. L. Bridger; R. W. Moulton; K. G. Clark and John O. Hardesty.

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Lyne Joins S. W. Sprayer

Tom Lyne, formerly with Sherwin-Williams Co., has joined the Southwest Sprayer & Chemical Co.,

TOM LYNE

the latter has announced. He will represent the company in the southwestern area. Mr. Lyne, a native of Oklahoma, holds degrees from Oklahoma A & M.

•

Expands BHC Output

E. I. duPont de Nemours & Co., Inc., Wilmington, Del. have announced an increase in production capacity of benzene hexachloride. The company anticipates that this move will help to prevent shortages such as occurred during the past season. Specifically, the increase will be more than 9 million pounds per year over the original capacity when the plant went into operation in 1949.

•

Grassland Meeting Planned

Meeting plans have been completed for the Grassland Farming Program to be held October 30 at the Netherland Plaza Hotel, Cincinnati, in connection with the convention of the American Society of Agronomy and the Soil Science Society of America.

The program, according to H. H. Tucker, director of the Coke Oven Ammonia Research Bureau, Columbus, Ohio, will be presided over by Wheeler McMillen, editor, *The Farm Journal*, Philadelphia. Dr. Firmen E. Bear, New Jersey Agricultural Experiment Station, New Brunswick, will talk on "Fertilization and Nutrition of Grasslands;" G. N. Hoffer, American Potash Institute, Lafayette, Ind., on "Building Soil Tilth with Grasslands;" and D. F. Beard, U. S. Department of Agriculture, Washington, will speak on "Grass and Legume Mixtures Essential for a Grassland System." D. Howard Doan, Doan Agricultural Service, St. Louis, Mo., will speak on "Grassland Farm Management."

In the afternoon, two farmers, Paul Strickler, Waterford, Va., and Willis Stout, Louisville, Ky., will describe "My Grassland Program and How I Built It." F. W. Duffee, University of Wisconsin, Madison, will describe the mechanization of grassland, and Herrell DeGraff, Cornell University, Ithaca, N. Y., will point out the economics of grassland farming. "Observations in a Recent Grassland Survey", by D. R. Dodd, Ohio State University, Columbus, will complete the program.

MEETINGS

National Agricultural Chemicals Association, Essex & Sussex Hotel, Spring Lake, N. J., September 6, 7 & 8.

National Pest Control Association, Netherland-Plaza Hotel, Cincinnati, Ohio, October 22-25.

California Fertilizer Association, Coronado Hotel, San Diego, Calif., November 2-4.

N. Y. State Insecticide & Fungicide Conference, Ithaca, N. Y., November, 14-16.

American Phytopathological Society Peabody Hotel, Memphis, Tenn., Dec. 1, 2, 3, 1950.

North Central Weed Control Conference, Milwaukee, Wisconsin, December 12-14.

American Association of Economic Entomologists, Denver, Colorado, Dec. 18-21.

Iowa State Fertilizer Conference, Ames, Ia., December 12-14.

Association of Official Agricultural Chemists, Shoreham Hotel, Washington, D. C., October 1-3.

Association of American Feed Control Officials, Shoreham Hotel, Washington, D. C., Oct. 4 & 5.

Association of American Fertilizer Control Officials, Shoreham Hotel, Washington, D. C., Oct. 6.

Association of Economic Poisons Control Officials, Shoreham Hotel, Washington, D. C., Oct. 7.

National Fertilizer Association, Edgewater Gulf Hotel, Edgewater Park, Mississippi, November 13-15.

Northeastern Weed Control Conference, New Yorker Hotel, New York, January 3-5.

Miller to New Atlas Post

J. V. Miller has been named director of a newly-created sales development division of Atlas Powder

J. V. MILLER

Co., Wilmington, Del., the company has announced.

Other advancements concern George J. King, newly-appointed director of sales of the Industrial Chemicals Dept.; C. D. Pratt becomes director of services in the Industrial Chemicals Dept.

•

CSC Names New Directors

Commercial Solvents Corp., New York, has named three new directors; Leroy A. Lincoln, president of the Metropolitan Life Insurance Co., Arthur B. Lawrence, senior partner of F. S. Smithers & Co., and Henry V. B. Smith, partner of H. J. Baker & Bro. The announcement was made by Major T. P. Walker, chairman of the board.

In addition to his activities in the insurance and law fields, Mr. Lincoln is a member of the board of directors of Chase National Bank, Home Insurance Company, and Union Pacific Railroad.

Mr. Lawrence is a director and a member of the Executive Committees of Continental Oil Company, Reynolds Spring Company, and Pocahontas Fuel Company, Inc.

Mr. Smith is a Director of Wilson & Toomer Fertilizer Company and the Southern States Bag Company, Jacksonville, Fla.; and Anderson Fertilizer Company, Anderson, South Carolina.

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TWO NEW PORTABLE ELECTRIC PUMPS

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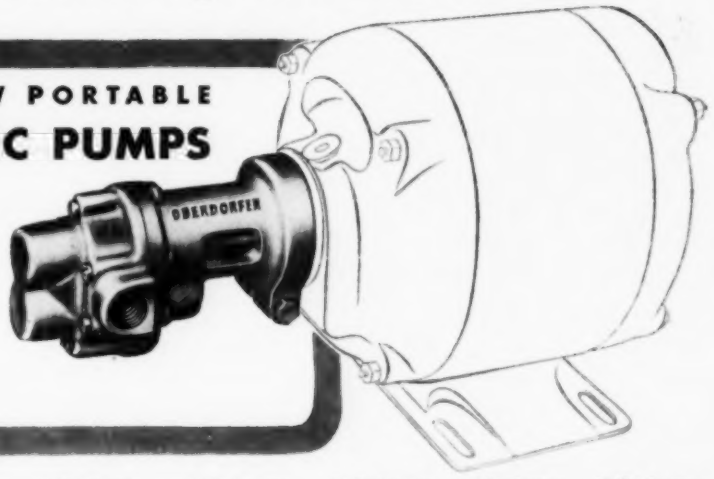

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GALLONS PER HOUR at 1725 R.P.M.	1½ CCC	120 gal.	110 gal.	100 gal.	95 gal.	90 gal.
	2 CCC	240 gal.	220 gal.	190 gal.	170 gal.	——

These two motor-coupled pumps with all bronze housings and gears, carbon bearings, mechanical seals, stainless steel drive shafts with machining tolerances as close as ±25/100,000 of an inch are powered by a heavy duty ⅓ h.p. motor (110 volt AC) equipped with thermal overload protection and eight foot extension cord. *Motor not standard — specially machined for pump mounting.*

PUMP No. 1½ CCC (⅜" pipe size) equipped with ⅓ H. P. 110 Volt AC Thermal overload motor (discount on pump head only — list $20.00). List price complete unit ..... $33.50 F.O.B. Syracuse

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3. Pressure pump for stock water bowls (pump No. 1½ CCC — 25 lbs. pressure)
4. Disinfecting farm buildings (pump No. 1½ CCC — 75 lbs. pressure)
5. Spraying flies (pump No. 1½ CCC — 75 lbs. pressure)
6. Pumping cleaning detergents through milking machines (pump No. 2 CCC — 50 lbs. pressure)
7. Liquid pump for filling tractor tires (pump No. 1½ CCC — 50 lbs. pressure)

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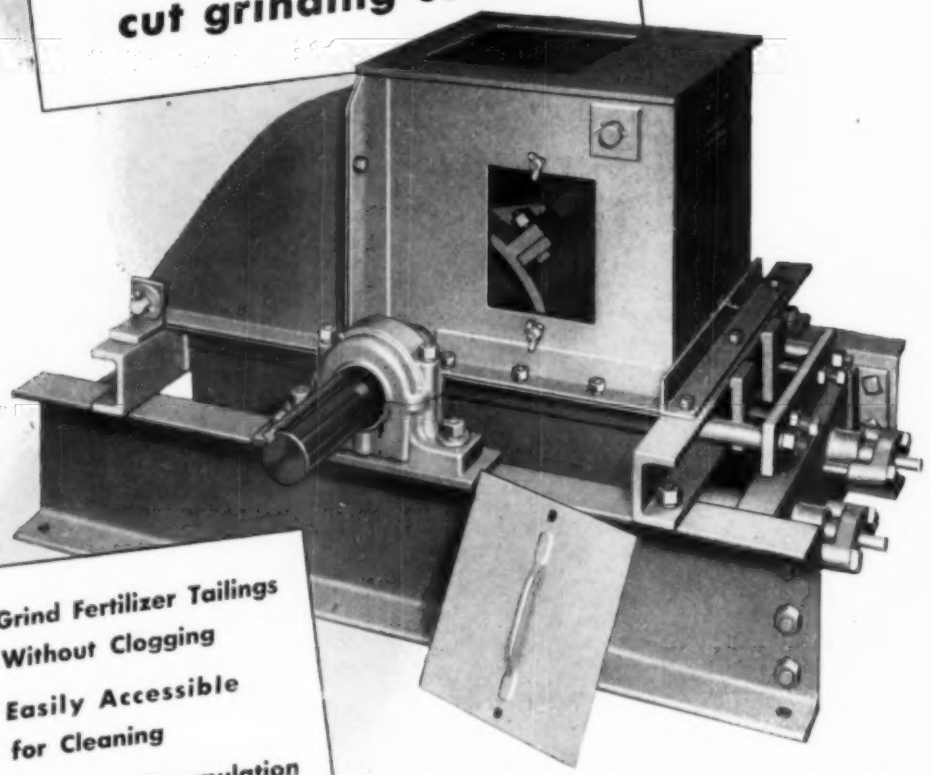

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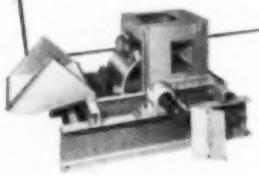

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The rigid rotating bars smash lumpy tailings against an adjustable breaker plate. These same rotating bars then rub oversize pieces against the plate assuring complete grinding of the tailings. Relief springs prevent stoppage, and a discharge free from restrictive grates eliminates clogging. There is *no* accumulation of unground raw hard pellets. The Sturtevant Rotary Pulverizer is superior to hammer mills because the hammers often stick . . . or cage mills that will not grind small pellets . . . or knives that only slice or shear. It can be used when basing, shipping superphosphate or complete goods. Capacities up to 35 tons per hour of tailings.

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Control Officials Meet in Capital in October

MEETINGS of four control officials groups are scheduled to be held at the Shoreham Hotel, Washington, D. C. in October. The Association of Official Agricultural Chemists will open the series with a three-day session beginning October 1, according to Henry A. Lepper, Washington, D. C. secretary-treasurer of the A.O.A.C. Details of the program were not available at press time, Mr. Lepper explaining that the deadline for reports had been extended as late as possible in order to give the referees more time to prepare their reports.

The Association of American Feed Control Officials will hold its 40th annual convention on October 4 & 5 at the Shoreham, it has been announced by Dr. L. E. Bopst, College Park, Md., secretary of the group.

Although full details of the program had not been announced at press time, Dr. Bopst said that several speakers had accepted invitations to appear. These included Edward Griffin, Allied Mills, Chicago; Dr. F. B. Morrison, Cornell University, Ithaca, N. Y., and president of the Morrison Publishing Co.; Dr. H. R. Bird, U.S.D.A., Beltsville, Md.; Lloyd Larsen, secretary of the American Dehydrators Assn., Chicago; and another representative of the U. S. Department of Agriculture.

The schedule for October 5 calls for reports of Association Committees, a business meeting and election of officers. Present officers are: Bruce Poundstone, Lexington, Ky., president; M. P. Etheridge, State College, Miss., vice-president and Dr. Bopst, secretary-treasurer.

The Association of American Fertilizer Control Officals will hold an all-day session on Friday, October 6, according to Dr. B. D. Cloaninger, Clemson, S. C., secretary-treasurer of the A.A.F.C.O. Although the complete program had not been announced at press time, it was indicated that topics to be discussed would include "Developing a Pasture Program in Virginia," by Dr. H. L. Dunton, Virginia Polytechnic Institute; and "Insecticides in Fertilizer," by Dr. M. D. Farrar, South Carolina Agricultural Experiment Station, Clemson. Others to appear on the program are John B. Smith, Kingston, R. I., A.A.F.C.O. president; Clifton A. Woodrum, president, American Plant Food Council, Washington, D. C.; Dr. Russell Coleman, president, The National Fertilizer Association, Washington; Dr. Kenneth Beeson, Cornell University; Walter Scholl and H. M. Wallace, U.S.D.A Washington; L. C. Jacobs, supervisor of Feeds, Seed and Fertilizers, Nashville, Tenn.; and Dr. S. F. Thornton, F. S. Royster Guano Co., Norfolk Va. Dr. Cloaninger stated that members of the industry are cordially invited to attend.

Saturday, October 7 will see the meeting of the Association of Economic Poisons Control Officials. Dr.

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Albert B. Heagy, secretary-treasurer of the Association states that titles of all the scheduled talks have not been received, but the program will include the appearance of Dr. J. F. Fudge, College Station, Texas, president of the A.E.P.C.O.; Dr. J. G. Townsend, medical director, chief of the industrial Hygiene Division of the Public Health Service; Wm. O. Buettner, executive secretary of the National Pest Control Association, New York; B. E. Conley, American Medical Association; and Dr. F. C. Bishopp, Assistant Chief, Bureau of Entomology and Plant Quarantine, U. S. Dept. of Agriculture, Washington, D. C.

Although the main portion of the A. E. P. C. O. is scheduled for Saturday, Friday night will be devoted to committee meetings. One of these, the States Relations Committee, will discuss problems of interest to both control officials and members of the manufacturing industry, Dr. Heagy said.

Conn. Station Observes its 75th Birthday

DETAILED plans are complete for the 75th Anniversary Celebration of the Connecticut Agricultural Experiment Station, New Haven, according to an announcement by Dr. James G. Horsfall, Director of the Station. The official observance of the founding of the Station, oldest institution of its kind in America, is scheduled for September 28 and 29.

Invitations have been sent to some 3,000 scientists, agriculturists and officials of government, universities, experiment stations and industry, both in this country and abroad.

Events will begin with an open house for delegates and the public, on the 28th. A series of special demonstrations has been arranged depicting current work of the station, and all laboratories will be open and in full operation.

The program on the first afternoon will include a talk by Arnold Nicholson, managing editor of *Country Gentleman*, on "Why An Agricultural Experiment Station?" That evening, the group will meet in the Law School Auditorium of Yale University for an address by Dr. Detlev W. Bronk, president of Johns Hopkins University. Dr. Bronk was recently elected president of the National Academy of Sciences for a four-year term and is also serving currently as chairman of the National Research Council.

The program for the second day of the Anniversary Celebration will begin at 2 P.M. with a symposium on "The Research Institute in Modern Society". Dr. Edmund W. Sinnott, Director of the Sheffield Scientific School and Dean of the Graduate School, Yale University, will be the moderator. In 1948, he served as president of the American

Nine Billion Pounds of Agricultural Sprays!

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Leading makers of insecticides and herbicides used Atlas emulsifiers to produce ninety million pounds of agricultural spray concentrates for the 1950 season! That adds up to the practical equivalent of something like nine *billion* pounds of spray and substantial evidence that Atlas emulsifiers have proved effective.

Here are two of many reasons for the wide acceptance of Atlas emulsifiers among formulators:

- Atlas production is geared to the peaks and valleys of demand for insecticides and herbicides—formulators know that Atlas can meet *on schedule* even the heaviest demands.
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Association for the Advancement of Science.

Four scientists will discuss various aspects of research. They are Dr. George O. Curme, Jr., vice-president in charge of chemical research, Union Carbide and Carbon Corporation, New York City; Dr. Selman W. Waksman, head, department of microbiology, New Jersey Agricultural Experiment Station; Dr. Alexander Wetmore, secretary, Smithsonian Institution, and Dr. Elvin C. Stakman, chief, division of plant pathology and botany, University of Minnesota.

Dr. Curme will speak on "Industrial Research"; while "Government Institutes" is the topic chosen by Dr. Waksman, discoverer of streptomycin. Representing endowed institutes and speaking on this type of research will be Dr. Wetmore.

The last speaker in the symposium, Dr. Stakman, will discuss "Universities". Dr. Stakman was elected president of the American Association for the Advancement of Science in 1949, and also holds a number of other honorary positions.

Events at the anniversary celebration will close with a dinner for delegates Friday evening at which Governor Chester Bowles, as chairman of the Station's Board of Control, will be toastmaster. Greetings will be given by the following: Dr. P. V. Cardon, Administrator, Agricultural Research Administration, U.S.D.A.; Dr. A. N. Jorgensen, president, University of Connecticut; Dr. Joe Webb Peoples, Professor of Geology, Wesleyan University; Dr. A. W. Griswold, president, Yale University; Dr. C. R. Orton, Director Emeritus, West Virginia Agricultural Experiment Station, representing the Association of Land-Grant Colleges and Universities; Dr. Bronk, representing the National Academy of Sciences; Mr. Walley Taylor, assistant agricultural attache, British Embassy, representing the Rothhamsted Experimental Station of England; Dr. George A. Baitsell, professor of biology, Yale University, and a representative of the Ass'n of Industrial Laboratories, not yet named.

Fertilizer Meet Planned

THE program has been announced for the 26th annual meeting of the National Joint Committee on Fertilizer Application to be held in Chicago December 18 in connection with the American Society of Agricultural Engineers. Dr. A. L. Lang, University of Illinois agronomist, will preside as general chairman of the meeting.

Dr. R. M. Salter, U. S. Department of Agriculture, will speak on "Improvement of Soil Productivity by Soil Management and through the use of Chemical Fertilizers and Organic Materials;" Glenn A. Cumings, also of the U.S.D.A., will present Kodachrome slides of fertilizer application equipment, followed by O. C. French, Cornell University Agricultural engineer, reporting on special equipment developed for experimental application of fertilizers.

George D. Scarseth, American

(*Turn to Page* 106)

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In six mesh sizes especially suited to packaging or blocking.

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Available in 55 gallon drums and 8,000 gallon tank cars.

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N. Central Weed Control Conference Plans Program

PLANS for the 1950 meeting of the North Central Weed Control Conference are well under way, according to H. E. Wood, Commissioner of Weeds, Manitoba Dept. of Agriculture, Winnipeg, Canada, vice-president of the N. C. W. C. C. The meeting will be held at the Schroeder Hotel in Milwaukee, Wisconsin, December 12, 13 and 14.

Plans for the program had not been completed at press time, but it was indicated by Mr. Wood that speakers would include Dr. F. W. Went, Professor of Plant Physiology, California Institute of Technology, whose topic will be "The Role of Environment in Weed Growth." Banquet speaker will be the Right Hon. J. S. Gardiner, Minister of Agriculture, Ottawa, Canada, on "Our Common Heritage."

In addition to the speaking program which will include the presentation of technical papers, there will be an extensive exhibit of herbicidal chemicals and application machinery at the meeting. The exhibit is under the direction of George M. Briggs, Extension Agronomist, University of Wisconsin, Madison.

A fourteen-man committe met recently in Minneapolis to plan the program. They are shown in the accompanying cut, left to right, front row: George M. Briggs, Madison, Wis.; Chas. J. Gilbert, Brookings, S. Dakota; H. E. Wood, Winnipeg, Man.; W. W. Worzella, Brookings, S. Dakota; Oliver C. Lee, Lafayette, Indiana; and R. S. Dunham, St. Paul.

Left to right—back row: E. P. Sylwester, Ames, Iowa; A. W. Buzicky, St. Paul, Minn.; L. M. Stahler, Brookings, S. Dakota; John H. Miller, St. Paul, Minn.; K. P. Buchholtz, Madison, Wis.; F. J. Greaney, Winnipeg, Man. R. L. Brandenburger, St. Louis, Missouri; and W. P. MacDonald, Minneapolis, Minn.

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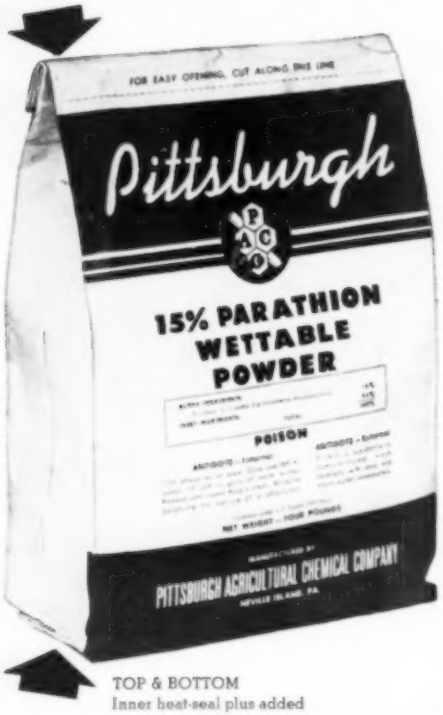

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Inner heat-seal plus added strength and protection of the "Duo-Tite" turnover.

If there is any bag that *positively won't* permit dry particles to sift, this is it! Betner's new method of construction combines special liners with folding, gluing and heat-sealing in such a way that there is virtually "No Sift" for contents.

This new Betner bag is perfect for insecticides, fertilizers and other chemicals that must be packaged in sift proof containers. It is also ideally suited for packaging foods. Available in sizes holding from 5 to 25 lbs. of bulk powdered material; can be preprinted up to four colors; and can be made in several combinations of materials.

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Betner can supply the special machinery for closing the "Duo-Tite" bag . . . it heat-seals, double folds and pastes the tops in exactly the same manner as the bottom is constructed. Your inquiries are welcome, and samples with full technical information will be supplied promptly.

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A complete bag service—from idea to finished bag to machinery for closing coffee bags and filling and closing liner bags for cartons.

Mente, Father & Son-Team

The Chicago sales office of Mente & Co., Inc., recently opened at 2425 Lawrence Avenue, will be in

LOERZEL, JR. LOERZEL, SR.

charge of George J. Loerzel, assisted by his son, George J. Loerzel, Jr. Mr. Loerzel senior has represented Mente & Co., Inc., New Orleans bag manufacturers, in the Chicago area for the past eleven years and is well-known in the trade. George J. Loerzel, Jr., was with the Army Air Force in World War II, and has a degree in Commerce and Business Administration from the State University of Iowa.

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Northeast APS Div. Elects

Edgar G. Rex of the New Jersey Department of Agriculture was elected president of the Northeastern Division of the American Phytopathological Society at the division's summer meeting, held at the Connecticut Agricultural Experiment Station, New Haven, Aug. 17 & 18. Mr. Rex will take office January 1, 1951, succeeding Ernest M. Stoddard of the Connecticut Station. Other officers elected are: vice-president, Dr. James M. Hamilton, New York State Agricultural Experiment Station, Geneva; secretary treasurer, Dr. S. G. Younkin, Campbell Soup Research Department, Riverton, N. J. and councilor, Dr. L. M. Black, Bronx Botanic Garden.

Chemotherapy was a main topic at the meeting. Research on this method of plant disease control was described by several scientists. Dr. A. E. Dimond, Mr. Stoddard, and Dr. R. A. Chapman from the Connecticut Station discussed work in progress there while Dr. A. W. Feldman of the Rhode Island Station reported on research in this field at his institution.

Other reports included a review of the proceedings at the recent International Botanical Congress in Sweden by Dr. F. L. Howard of the Rhode Island Station, a discussion of his work on antibiotics by Dr. B. M. Duggar of Lederle Laboratories, Pearl River, N. Y., and a description of research on late blight of potatoes by Dr. Russell A. Hyre of the University of Delaware. A tour of laboratories and field plots in Connecticut where research in their field is going on featured the second day of the session.

•

Kentucky for Pastures

The month of August was proclaimed as "Green Pastures Month" in Kentucky by Governor Earle C. Clements. This proclamation was in keeping with similar ones made by other State Governors in the interest of soil improvement efforts.

Chlordane

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NFA to Mississippi in Nov.

The annual fall meeting of the National Fertilizer Association will be held at Edgewater Park, Miss., November 13-15, the NFA has announced. Program details were not available at press time, but according to W. E. Chace, NFA information chief, the complete program should be announced shortly.

•

Research Coordinator

George L. Wirtz, President of the Atlas Mineral Products Company, Mertztown, Pennsylvania, has announced the appointment of Dr. Robert H. Steiner as Research Coordinator for the company. Dr. Steiner received his B. S. degree with highest honor at the University of Pittsburgh and his Ph.D degree at the same institution.

•

Atlas Expand Plant

Expansion of the sorbitol plant capacity at Atlas Point, Wilmington, Del., has been announced by Isaac Fogg, President of Atlas Powder Company. Capacity of the sorbitol units will be increased by nearly 50% and the new increased production will start about October 1, 1950.

Atlas first started making sorbitol in commercial quantities at Atlas Point in 1937. In 1947, a new sorbitol plant was built at a cost of over 3 million dollars.

Sorbitol is an alcohol belonging to the same chemical family as glycerin, and is used for many of the same purposes as glycerin, although it possesses many unique and advantageous properties of its own. Its uses include the producing of emulsifiers and other surface active agents. Special types are made for use in agricultural sprays, polishes, waxes, and many other uses.

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Conn. Nurserymen Meet

About 75 members attended the summer meeting of the Connecticut Nurserymen's Association held August 15 at the State Agricultural Experiment Station, New Haven. Robert Bennerup, Kensington, Conn., Association president, was in charge. Appearing on the program were Dr. James G. Horsfall, director of the Station; John C. Schread, entomologist, Dr. Herbert A. Lunt, soils scientist, Dr. Albert E. Dimond, chief plant pathologist and Ernest M. Stoddard, plant pathologist.

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Chilean Nitrate Asst. S.M.

J. F. Doetsch, president of Chilean Nitrate Sales Corporation, New York, has announced the appointment of Fred P. Bryan as assistant sales manager of the corporation with headquarters at Raleigh, North Carolina; B. Frank Crumpler as district manager for N. Carolina, Virginia and West Virginia with headquarters at Raleigh; and Edwin Sterne Jr. as district manager for S. Carolina with headquarters at Columbia, South Carolina. J. S. Howard, district manager at Columbia, South Carolina, is retiring after more than 20 years service.

DEFENSE PRODUCTION

Developments in defense production as they relate to the agricultural chemicals industry are being reported to NAC members.

Adequate supplies of pest control chemicals must be maintained in order to protect the nation's food and fiber production.

NAC is cooperating with the defense agencies of government to make this possible.

To keep abreast with developments in defense production, membership in NAC is essential.

National Agricultural Chemicals Association

Barr Bldg., 910 17th St., N.W. Washington 6, D. C.

New Quaker Oats Plant

Quaker Oats Company has announced plans to start immediate construction of a chemical plant in Omaha, Nebraska. This plant will produce the chemical, "Furfural," which the company has been producing since 1922. It is used in the manufacture of fertilizer to prevent caking.

This plant will be similar to the Quaker plant located at Memphis, Tennessee, which was purchased in 1946. However, the plant at Omaha will not contain a powder plant such as the one at Memphis.

The new plant is expected to be completed and in production by the end of 1951. The operation will employ about 100 people.

The Omaha plant brings the total number of Quaker plants to 15 major units located as far East as Depew, New York, and on the West Coast in Los Angeles and Portland. In addition to these plants, Quaker, the first company to produce Furfural on a commercial basis, has sales offices in most major cities and 65 country grain elevators in Illinois, Iowa, Kansas, Mississippi, Missouri, and South Dakota.

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Arkell Names Robertson

J. H. Robertson has been appointed Comptroller of Arkell and Smiths, it was announced recently by the Board of Directors of the Canajoharie, New York bag manufacturing company. He will make his headquarters at Canajoharie.

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Allethrin Tests Made

An ivestigation of the toxicity of allethrin (the allyl homolog of cinerin I) has been performed on material recently synthesized by the Carbide and Carbon Chemicals Division. This substantially pure compound posesses insecticidal properties comparable to the natural pyrethins.

Repeated daily exposures of rats and dogs to aerosols, containing 1% allethrin or comparative materials, at a dosage level of 50 grams of total formulation per 1000 cu. ft. of space caused no injury to the animals. This exposure level represents 10 times the concentration used to free aircraft of insects and about 30 times the household use level. Rats received a maximum of 85 and dogs 40 exposures, each of 30 minutes duration.

Massive concentrations of aerosols, 360 times the level used for the repeated exposures, did not harm rats in single 30 minute exposures. Even more striking is the fact that only 1 of 10 rats succumbed after 2 hours exposure to a concentration of 19.0 mgm. liter of pure allethrin fog, or an amount 10,000 times that which would be utilized to free aircraft of insects.

The single dose acute oral LD50's of commercial allethrin for non-fasted rodents observed 14 days after being fed 20% dilutions of commercial allethrin in deodorized kerosene are as follows: mice 0.48, rats 0.92, and rabbbits 4.3 gm./kg. Two different samples of 20% purified pyrethrins in petroleum distillates had oral LD50's of 0.82 and 1.87 gm./kg. for rats.

The LD50 of undiluted com-

mercial allethrin for rabbbits by single dose skin penetration based upon a 24 hour contact period under impervious sheeting and a total 14 day observation period is 11.2 ml./kg. Dilution in petroleum distillates markedly increases percutaneous toxicity but dimethyl phthalate appears not to aid penetration.

Rabbit eyes are not injured by the undiluted allethrin, although single uncovered skin applications cause capillary injection and repeated applications result in moderate erythema. Drill cloth impregnated with 4 gm./sq. ft. of allethrin caused marked erythema of the rabbit trunk when worn for 3 days. However, this reaction subsided with subsequent wear and during a 21 day interval no systemic injury resulted.

Guinea pigs were not sensitized by a course of 8 intracutaneous injections during 2½ weeks, of a 0.1% dispersion in propylene glycol and saline, followed by a 21 day incubation period before introduction of the sensitizing test dose.

The evidence presented indicates that commercial allethrin is of the same order of toxicity as pyrethrins and on the basis of this comparison the conclusion is reached that it may be used safely in insecticidal sprays and aerosols.

—*Archives Industrial Hygiene & Occupational Medicine*. Vol. 1, 1950.

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Ryker to Semesan Division

Dr. T. C. Ryker, plant pathologist for E. I. du Pont de Nemours & Co., Inc., has been transferred from Baton Rouge, La., to the company's Semesan Section at Wilmington, Del. His new duties will be in the field of seed disinfectants and he will furnish technical information on this subject.

Dr. Ryker holds a bachelor of science degree in horticulture from Mississippi State College, a master of science degree in botany from Louisiana State University, and a Ph.D. in plant pathology from the University of Wisconsin. He had been on the staff of the Louisiana Agricultural Experiment Station before he joined Du Pont in 1947. From 1947 until his transfer to Wilmington he conducted field experiments with new pesticides at Baton Rouge.

•

Victor to Build New Plant

Victor Chemical Works has announced that construction of an electric furnace plant at Silver Bow, near Butte, Montana, was approved by the board of directors. Construction is to begin immediately. The plant will manufacture elemental phosphate rock drawn from nearby deposits. The location of the plant, and the selection of the mines, are the result of an investigation carried on over a long time by Victor engineers and chemists. The company now operates phosphorus plants in Tennessee and in Florida, and four other plants in Illinois Tennessee, Pennsylvania, and California in which phosphorus is processed into various types of phosphates and phosphorus compounds.

all over the country *(and abroad, too)*

Insecticides are Blended *with* Sprout-Waldron *equipment*

From Trenton, New Jersey . . .
came the story of the successful Vahlsing installation featured in the October, 1947 issue of Agricultural Chemicals.

In Lansing, Michigan . . .
two Sprout-Waldron blending systems are each consistently producing 7-10 batches per hour.

Pennsylvania Influence . . .
an enviable reputation was built in the first six months of operation. Visiting representatives from Farm Co-ops in other states unanimously characterized the dust as being the finest, most uniform blends they had ever examined.

A Georgia Installation . . .
Accurate production records over three months period showed sustained rates of 120-234% over the minimum factory rating for installation. Five distinct formulas totaling more than 450 tons were blended during this period.

An operator in South Carolina reports:
"We are greatly pleased with the performance of our Sprout-Waldron system. We believe without a doubt that the dust produced on our equipment surpasses anything else on the market in the South today. Representatives of the producers of the technical toxicants used by us agree with this opinion. We have produced something like 300 tons of Chlordane and Toxaphene field strength dusts this season on the equipment and expect to do at least 400 additional tons. We can imagine no better mechanical principle for the proper mulling of insecticides than the principle of this mill."

Phoenix, Ariz. . . .
reports tremendous production rates by the addition of an over-size motor on the blending mill. With a 6-man crew, 8000-9000 lbs./hour are regularly attained. For unexpected demands, peak daily rates averaging nearly 300% of minimum factory rating has been achieved.

In North Carolina . . .
a plant manager reports, "Everyone who visits our plant agrees that we have the most compact, efficient system they have yet seen. Several of the ingredient salesmen have already stopped to take pictures of our Sprout-Waldron blending system."

In Presque Isle, Maine,
a capacity of 6 - 1000 lbs. batches per hour without interruption was reported. A 4-man crew handled this job using four formula operations and packaging into 50 lb. bags. To meet peak demands during the dust season, levels as high as nine batches per hour are maintained for limited intervals with the same crew. Such peaks exceed the guaranteed factory rating by 125%.

Write for Bulletin I-846 today! Sprout, Waldron & Co., Inc., 7 Waldron Street, Muncy, Penna.

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Manufacturing Engineers
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Opens Texas Fert. Plant

The "Hi-Yield" Fertilizer Co. has opened a new fertilizer plant at Bonham, Texas, and is now supplying farmers of the community with fertilizers, and insecticides. H. Dean Smith, president and general manager, said that the company is chartered with $150,000 working capital and occupies a building formerly used as an oil-mill operation. Harold Baker is field representative for the company, Joe Gowan plant superintendent and Howard J. Miller is in charge of retail sales.

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Monsanto Names Faust

Appointment of Harry W. Faust as an assistant director of the St. Louis Research Department, Organic Chemicals Division, of Monsanto Chemical Company, has been announced. Mr. Faust will head a section created within the department to meet the expanding needs of application research, including the formulations of agricultural chemicals.

•

Solvents Affect Plants

During the summer of 1945 DDT emulsion and solution sprays containing different solvents were tested on the foliage of numerous field crops at Long Beach, Miss., and Atmore, Ala. Four applications at dosages of 1 to 2 pounds of DDT per acre were made to determine the most satisfactory solvent for use in white-fringed beetle control. Of eight solvents used, "Amsco-Solv A" was the most satisfactory, closely followed by xylene. In general, the kerosene formulas, both emulsions and solutions, caused excessive foliage burn. The foliage of sweet-potatoes and peanuts were least affected. None of the sprays, at the dosages employed, affected the yield of snap beans or tomatoes, but there were indications that formulations containing kerosene would affect the yield of squash adversely.

Tests were also conducted in 1945 to determine the effect of DDT-xylene emulsion on the foliage of nursery plants. From one to seven applications were made during the summer with 1 to 10 pounds of DDT (1 to 10 quarts of xylene) per acre-application, or a total of 7 to 30 pounds of DDT (7 to 30 quarts of xylene) per acre-season. There was no evidence of foliage burn or indication that bud formation or new growth had been affected.

In 1946, because of its availability and comparative low cost, xylene was the only solvent used in DDT-emulsion formulations for additional tests and for field control against adult white-fringed beetles. Emulsion sprays were applied at rates up to 10 pounds of DDT (10 quarts of xylene) per acre-season to the foliage of field crops and ornamentals, and the results were entirely satisfactory.

In 1948, tests conducted on potted bean plants and field-grown beans and peas showed that either coal-tar or petroleum xylene is satisfactory for use in white-fringed beetle control.—USDA Bulletin E-806, July, 1950.

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FOR AMERICAN AGRICULTURE

*GENERAL CHEMICAL

"Basic Chemicals for American Agriculture" Give "Standout" Performance Because They are Backed by—

- Nearly a half century's experience in the production of agricultural insecticides and by close association with growers in their use.
- Extensive research in laboratory and field.
- Continuous production control for highest quality and constant uniformity.

Specify

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DDT: Technical, Finely Ground and Flake
High Concentrate Wettable
High Concentrate Dust Base
Solvent Concentrates
Emulsifiable Concentrates

BHC: Technical Grades
Finely Milled Dust Base Concentrates
Wettable Concentrate

NICOTINE: Alkaloid
Sulfate 40% (as alkaloid)

PARATHION: 15% and 25% Finely Milled, Wettable and Dust Base

LEAD ARSENATE: "Astringent," Standard and Basic

CALCIUM ARSENATE: Standard and Special Low Lime

Other Basic Toxicants: Specialized organic and inorganic insecticides, fungicides, spreader-stickers; also hormone pre-harvest spray materials.

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Offices in Principal Cities from Coast to Coast

Stogis to New Position

Peter D. Stogis has been appointed general manager of the Chicago office of Thompson-Hayward Chemical Co., the firm has announced.

•

Nutrition & Insect Control

It may be possible to control many insect pests through their diet or nutritional needs, says Dr. Leonard Haseman, Chairman, Dept. of Entomology, University of Missouri, Columbia, Mo., in an editorial in the June 1950 issue of the *Journal of Economic Entomology*. "There is definite evidence," he reports, "that we may be able, by stepping up the major and the minor soil minerals and other soil nutritional factors, to produce larger crops providing optimum balanced rations for man and livestock but crops which may prove distasteful or even harmful to the well-being of some of our insect pests."

The idea of controlling insects through the soil by altering the nutrient qualities of their food, is not new, Dr. Haseman reminded, Dr. J. B. Smith having reported striking results fifty years ago in insect control through the use of soil fertilizers. It is Dr. Haseman's belief that if such control of insects through diet can be extended, "it will be largely through reducing their reproductive potential, though it will also help where we are able to affect their physical well-being and such factors, for instance, as wing development."

Among several specific examples he pointed to the chinch bug, "a major crop pest which has quite definitely been shown to be influenced by the one mineral, nitrogen, in its diet. In nature it passes up the nitrogenous legume crops for the grassy crops which are higher in carbohydrates. It is on the stunted corn, for instance, up on the eroded slopes where it thrives best rather than down on the vigorous plants at the foot of the slopes where soil moisture and fertility provide higher levels of nitrogen in the plant sap. Also the pest thrives best and menaces our crops most in periods of dry years when all crops tend to suffer from lack of soil moisture laden with soil minerals including the tell-tale nitrogen. Different workers studying the chinch bug under controlled conditions have found that on a diet of corn plants grown in nutrient solutions low in nitrogen it is normally more vigorous, lives longer and lays more eggs than when on a diet high in nitrogen. We have in the chinch bug, therefore, apparently one major pest which we should be able to reach through its diet by stepping up soil fertility."

Hooker Names Four

Hooker Electrochemical Company, Niagara Falls, N. Y. has announced that Joy E. Beanblossom has been made manager of development, James S. Sconce manager of research and Dr. Bruno H. Wojcik has been named as assistant to the technical superintendent. In the sales development department, James S. Walker has been appointed as supervisor of technical sales service.

THE TREND is to

More and more users of insecticides are finding that formulations which can be applied as liquids are not only more easy to use, and less wasteful, but are most effective as killers.

Outstanding concentrates for liquid insecticides are obtained by compounding toxicants with Nopco 1219-A and Nopco "Agrimul"† products.

These specially developed emulsifiers for Toxaphene, Chlordane and other polychlor concentrates, permit of a wide variety of formulations—yielding insecticides eminently suitable for agricultural applications.

Nopco 1219-A—is a 100% active blend of anionic and non-ionic chemicals that gives a high degree of emulsifiability to Toxaphene and Chlordane.

Nopco "Agrimul" 60—is a 100% active, viscous, anionic emulsifier which gives *instant dispersibility* in water—even when used in low quantities such as 5.0% to 7.5% on the weight of 46% to 60% Toxaphene or Chlordane. Recommended in blends of emulsifiers for DDT, Lindane, and plant hormone esters.

Nopco "Agrimul" 30—is a 100% active blend of alkylated aromatic compounds and ethylene oxide on polymerized vegetable oils. It has many of the characteristics of "Agrimul" 60, plus unusual hard water resistance.

Emulsion-type insecticides compounded with these superior Nopco chemicals afford the following important advantages:

Economical production—low cost finished insecticides are obtained.

High stability to acidity of toxicant—in both concentrate and emulsion form.

Excellent hard water resistance—with effectiveness up to 1000 p.p.m.

Long life—Concentrates can be stored for long periods without loss of emulsifiability.

All of which adds up to superior, easy-to-make, easy-to-use, long life insecticides at *low cost* . . . the reason why the trend is to Nopco 1219-A and Nopco "Agrimul" series today!

So profit by learning all about these top-notch emulsifiers. Full information, including formulas, is yours for the asking . . . and our Technical Service stands ready to help you solve specific insecticide formulation problems.

*Reg. U. S. Pat. Off. †Trademark applied for

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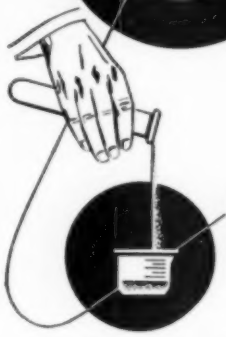

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TENNESSEE CORPORATION

Two Advancements Noted

Westvaco Chemical Division of Food Machinery & Chemical Corp., New York, has announced that Don C. Oskin, division sales manager, has been made director of district sales. Mr. Oskin was at one time resident manager at Detroit and subsequently division sales manager at New York in charge of alkali and phosphate sales. In his new position, he will correlate the activities of Westvaco branch offices throughout the country.

Simultaneously, James R. Harris, Jr. who has been Mr. Oskin's assistant, becomes division sales manager at New York in charge of phosphate sales. These moves are in anticipation of the recently announced addition of a third electric furnace for the production of elemental phosphorus at Westvaco's Pocatello, Idaho plant and the construction of a new processing plant at Lawrence, Kansas.

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Buys Experimental Farm

Rohm & Haas Company, Philadelphia, has purchased a 211-acre farm in Bucks county, Pennsylvania, for the purpose of extending its experimental research with agricultural chemicals. The farm is located near the city of Langhorne, with soil well suited for the growing of fruit trees on which the company expects to conduct tests.

•

Plan Costa Rica Operation

Costa Rica International Sulphur Corp., San Jose, C. R., is planning to begin operation in Costa Rica for the production of fertilizer material and sulfuric acid. General offices of the company are in Houston, Texas.

•

Kolker BHC Plant Runs

Commercial production of BHC at the new Houston, Texas, plant of Kolker Chemical Works, Newark, N. J., has been announced by the company. The technical product will have a high gamma content of 36%, as compared to the 12-14 percent content of the normal product. The company points out that in reducing the percentage of other isomers and concentrating the gamma isomer to 36%, it is possible to produce dust and emulsion concentrates of high quality. Other advantages, according to the makers, include savings to consumers on freight and warehouse costs.

Production of BHC was centered at Houston because of available raw materials and markets for the finished product, according to J. G. Brunton, vice-president of Kolker. During the past two seasons there has been an insufficient amount of BHC produced to supply demands of southern cotton farmers, Mr. Brunton states. The substantial production available to insecticide manufacturers from the new Kolker plant is expected to satisfy the increased requirements for the material, he says.

Kolker is also a basic manufacturer of DDT, 2, 4-D and 2, 4, 5-T at the company's Newark, N. J., plant.

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FOR BAGGED PRODUCTS

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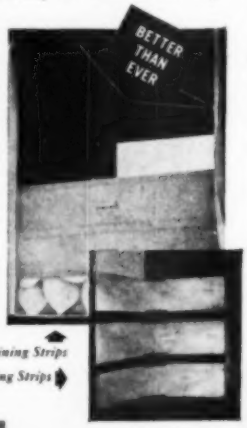
nailed across freight car doorways—either spaced or overlapped—hold load firmly in position, prevent side shifting. Low cost... easy to unload... they reduce dunnage weight, eliminate car door liners.

Made of heavy kraft paper and reinforced top and bottom with strong steel strapping, Signode Retaining Strips are available in two types: *Regular*—for use on non-loading doorway; and *Duplex*, with the "walk in" feature—an entirely new development for loading doorway—specially designed to be severed in the center and then resealed.



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TYPICAL CHARACTERISTICS OF MONET-O-X

Fineness	99% through 325 mesh
Density (Vibrated)	26.7 pounds per cubic foot
PH Value	Below 7.0
Inert	Compatible with insecticide and fungicide poisons
Suspension	Excellent in both air and water

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MONET-O-X Grinders Inert. Increase grinding production, and conditioning of Sulphur. The most economical Inert on the market.

Samples on Request

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MINES AND PLANT MONETTA, S. C.

New Forest Insect Head

Dr. James A. Beal has been selected to head the U. S. Department of Agriculture's forest insect research and surveys, Avery S. Hoyt, chief of the Bureau of Entomology and Plant Quarantine has announced. Dr. Beal's appointment as leader of the Division of Forest Insect Investigations became effective August 21.

Dr. Beal returns to the USDA from the Duke University School of Forestry where for the past eleven years he has taught forest entomology and conducted research on forest insect problems in the Southeast. He succeeds Dr. F. G. Craighead who retired from Government service last May after having served for 27 years as leader of the Division of Forest Insect Investigations. In his new position Mr. Beal directs the Bureau's forest insect work which is carried on from headquarters at the Agricultural Research Center at Beltsville, Maryland and at eleven field offices located in important forest regions.

•

N E Weed Meeting in Jan.

Dates of the 1951 meeting of the Northeastern Weed Control Conference have been announced by Walter S. Jacob, Riverhead, N. Y., secretary-treasurer of the group. Choosing the same locale as the 1950 meeting, the meeting will be held at the New Yorker Hotel, New York City, January 3, 4 & 5. Mr. Jacob stated that hotel reservation cards and programs will be mailed about the first of October. Titles of papers to be presented were to be submitted by September 15, he said. Chairmen of the sections are: agronomy, Prof. C. E. Phillips, U. of Delaware, Newark, Del.; horticulture, Dr. J. R. Havis, Virginia Polytechnic Institute, Blacksburg, Va.; woody plants, T. R. Cox, American Cyanamid Co., 30 Rockefeller Plaza, New York 20; public health, A. H. Fletcher, New Jersey State Dept. of Health, Trenton; and general subjects, Mr. Cox.

•

Davison Sets Safety Record

A reduction of 67 per cent in accident frequency rate and a 50 per cent reduction in accident severity rate during 1949, enabled the Phosphate Rock Division of The Davison Chemical Corporation to get down to 22 per cent of its industry group average for frequency and 5 per cent for severity during the year, the company has announced.

In the same year Davison's Curtis Bay works achieved a frequency rate of only 16 per cent of the average for its industry, and a severity rate only 12 per cent of its industry average.

One result of these safety records was the presentation of two Distinguished Service To Safety awards by the National Safety Council on August 10. Earlier the U. S. Bureau of Mines also sent the company a letter of commendation and awarded a certificate, and Davison received the largest returned premium ever paid by the Maryland Casualty Company to any company carrying policies of comparable size. The returned premium was in excess of $30,000.

Writes of Long U. S. Tour

Dr. Charles E. Palm, head of the department of entomology at Cornell University, Ithaca, N. Y., has recently returned from a sabbatical trip of inspection at state experiment stations, colleges and universities. While enroute home to Ithaca, Dr. Palm wrote a brief account of his travels, much of which is of interest to our readers. Excerpts from this letter follow: (written at Bozeman, Montana)

". . . we are on the last lap of our trip, so will be heading back through Wyoming, S. Dakota, Minnesota, Wisconsin and Michigan. It has been a wonderful trip. After visiting Florida, we went through the gulf states and saw experiments under way for control of the sweet potato weevil with DDT. Sugar cane borer control is important in Louisiana, with the State having made a generous appropriation for Louisiana farmers to apply control material. However, the new insecticides increase the population at the end of the season due to the destruction of parasites and predators of the borer. Cryolite and ryania are their recommended materials for this project. All the toxicants are applied by plane.

"At Texas A & M college, an airplane is being built for use in agriculture. It is a project being carried out jointly by the Civil Aeronautics Authority, the Flying Farmers Association, the U. S. Department of Agriculture and by Texas A & M. Original models, which I saw, look like this plane will solve some of the problems of aircraft operations such as seeding, fertilizer distribution, spraying, dusting, etc.

"South of the border, the use of insecticides is making history in correcting some of the agricultural insect problems of Mexico. U. S. Officials are interested in watching the citrus blackfly lest it be introduced into the U. S. from Mexico. New speed sprayers in use there are playing a prominent role in the field program. Rotenone and oil seemed to be more effective than any of the newer insecticides in controlling the insects.

Control of houseflies in California is being accomplished largely by pyrethrum, since the flies there have exhibited resistance to DDT, lindane, chlordane and aldrin.

"Fruit growers in the Pacific northwest regard the benefits wrought by the new insecticides as a kind of modern miracle, and are delighted to gain control of insect infestations with from two to three applications of DDT and parathion as compared to the former schedule of seven applications with lead. New application methods are beginning to come into the picture in the Washington area. Chemicals for fruit-thinning and for stopping drop are also important in this section."

Dr. Palm states that he has taken scores of photographs of interesting operations along the way and also some of personal interest such as pictures of moose and elk running freely on the western plains.

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F. D. A. HEARING

(*Continued from Page 91*)

Systemics Discussed

ENTOMOLOGICAL, chemical and toxicological research on a systemic material (Bis-(Bis-Dimethylaminophosphorus) Anhydride) (OMPA) was reported by Dr. Walter E. Ripper, managing director of Pest Control Limited, Cambridge, England. He explained that when the compound is applied in any one of four ways (as a spray, an aerosol, seed treatment or by soil application), the substance is taken up into the plant juices and translocated to a limited

extent in the plant. Thus, after a period of absorption and translocation it becomes inaccessible to any but sap feeders and is also less available for evaporation or contamination of workers handling sprayed material. The method has been found effective against over 20 aphid species and on several Tetrahychid mites; that it has only a weak contact action insufficient to affect plant-eating insects, pollinators, predators and parasitic insects; and that ladybugs have lived after being fed with aphids killed by OMPA. Dr. Ripper pointed out that use of systemics offers prevention of insect-transmitted virus diseases, frequently causes plant stimulation and no appreciable residue is left provided an interval of 6 weeks between spraying and harvesting is observed.

Dr. Frawley continued by stating that the oral LD/50 of OMPA varies from 10 mgs. to 30 mgs./kg. with different species. Regarding its toxicity to humans, he said that 1 mg. per day could be ingested without injury for long periods by human beings, including children old enough to eat fruits and vegetables.

Dr. Knipling returned to the stand to testify on the acute and subacute studies of TDE on livestock, reporting on the amounts of the material stored in animal fat after various periods of treatment. Cattle treated 3 times at 2-week intervals with 0.5% TDE emulsion spray, showed respectively 13.2, 32.7 and 36.5 ppm two weeks after treatment, he said. Dr. Fitzhugh estimated that a daily intake of 5 mg. would be safe for human beings.

Dr. Harvey B. Haag summarized the data on "Rhothane" (2, 2-bis- (p-chlorophenyl)-1, 1, dichloroethane), pointing out that rats exposed to "Rhothane" in their diets can survive at a level 4 times greater than is the case with rats similarly exposed to DDT.

Ernest C. Hagan, F. D. A., testified on the same material, but stated that the experiments previously described and the reports of human toxicity taking the related compound, dinitrophenol, did not permit a basis for an answer as to what quantities of these products might be taken daily by humans without injury.

Somewhat the same was true of the fungicide "SR-406" (N-trichloro-methylthio-tetrahydro - phthalamide) covered by Dr. Voss. He said there is not enough information on which to base an opinion as to how much "SR-406" might be ingested daily for long periods of time without human injury.

Dr. Norton Nelson, Director of the Laboratory of Industrial Toxicology at New York University continued on the subject of "SR-406", stating that the material appears to be of low toxicity by skin penetration, but reasonable precoutions should be taken.

Dr. Merritt P. Sarles, U. S. Industrial Chemicals, Inc., Baltimore, reported on the low toxicity of piperonyl butoxide, piperonyl cyclonene, and "Compound 469," synergists for pyrethrum. Dr. Herman Shelanski appeared again to testify on the toxi-

city of 2-cyclohexyl-4, 6-dinitrophenol dicyclohexylamine safe on dogs. His assistant, Dr. J. T. McGrath, veterinarian, also testified on the subject.

Dr. Howard C. Spencer, Dow Chemical Co., testified that the material 2-sec. butyl-4, 6-dinitrophenyl (DNOSBP) could have a residue tolerance of 8 ppm on fresh fruits and vegetables with a margin of safety.

Dr. Bernard Davidow, F. D. A., in testifying on 2, 4-D, stated that in his opinion, 5 mgs. of 2, 4-D per day would be safe for a human being. He also brought out later that this is not necessarily a maximum level, but rather, merely a "safe" level. Verald K. Rowe, Dow Chemical Co., stated that a residue tolerance of 8 ppm of 2,4-D on fresh fruits and vegetables would provide a wide margin of safety. About the same safety margin would be applicable for 2, 4, 5-T, he said.

Returning to the stand, Dr. R. C. Spencer, Dow Chemical Co., discussed the product "Neotran" (bis (parachlorophenoxy) methane). On the basis of rats tolerating 1,000 ppm and allowing a 10-fold margin for specie variation, a man could ingest safely 250 mgs. daily, or 25 mgs. daily on a 100-fold margin, he said.

Mr. Rowe also returned to the stand to report on parachlorobenzenesulphonic acid, which he said could be tolerated safely in man at 7.5 mgs. per day.

Dr. A. P. Richardson, Emory University of Medicine, Atlanta, said that the general symptoms produced in laboratory animals by "Dilan" are essentially the same as for either methoxychlor or DDT.

Regarding "Aramite," Dr. Bernard L. Oser, director of Food Research Laboratories, Long Island City, N. Y., said that 150 ppm should prove innocuous to man. Dr. T. H. McGavack, New York, discussed "Spergon" (tetrachloroparabenzoquinone), stating that on the basis of experiments, a gram a day for man would be safe.

Dr. Fitzhugh returned again to testify on Chlordane, stating that "any residue of chlordane on fruits and vegetables would be unsafe." Dr. Lester Ingle, University of Illinois, stated that daily intakes of 30 ppm chlordane on laboratory animals produced no significant differences from controls. Dr. Knipling continued on the subject of chlordane, stating that no traces of the toxicant remained in animal fat after 8 weeks. Dr. Arthur A. Nelson, F. D. A., stated that it will take two or three times as much DDT to give the same amount of damage as imparted by chlordane.

Testifying on heptachlor, Dr. Fitzhugh stated that "heptachlor is more toxic than technical chlordane, (and) it is my opinion until further evidence, that heptachlor is in the same category as chlordane."

Regarding dieldrin, Dr. W. J. Hayes, Jr., U. S. Public Health Service, said that residual injury from it persists in the body for a long time once severe poisoning has occurred. Dr. R. D. Radeleff, U. S. D. A., described experiments with dieldrin on

cattle and Dr. Fitzhugh stated that since chronic toxicity studies of dieldrin in animals are lacking, dieldrin should be placed in the same category as chlordane.

Aldrin was the next subject, with Dr. Fitzhugh stating that the compound has action similar to that of chlordane, but a given dose appears to kill faster. It should be placed in the same category with chlordane, he said. Dr. Roger P. Link, University of Illinois pharmacologist, stated that aldrin-sprayed hay has a "low order of toxicity toward animals to which it was fed."

Dr. Frank Princi, University of Cincinnati declared that all ordinary precautions should be observed to prevent excessive accidental exposures and skin absorption of aldrin.

Moving on to the subject of BHC and lindane, Dr. Fitzhugh said that in comparison with DDT, the gamma isomer (lindane) appears to be less toxic and the technical mixture equally as toxic as DDT. Dr. F. E. Heyroth, Kettering Laboratory, reported that plant workers who had received quantities of dust in their hair, clothing and shoes for a two year period, were without illness from such exposure.

Dr. Heyroth also testified on TEPP and HETP (tetraethylpyrophosphate and hexaethyltetraphosphate, respectively), stating that although both of these compounds are toxic, it is evident that no TEPP or HETP will remain as spray residue. Dr. Frawley declared that TEPP was observed to be from 4 to 14 times as toxic as parathion, but that 2½ mgs. of the normal degradation products of TEPP would be safe for repeated daily human digestion.

Geoffrey Woodard, F. D. A., in discussing Copper 8-Hydroxyquinolate, said that its toxicity is of a low order, and any tolerance established for copper would be safe for this compound.

Dr. Owen S. Gibbs, Memphis, Tenn, said that human beings consume small portions of mercury to the extent of "25-30 mgs. per day," and that small amounts are entirely harmless. "Mercury behaves like arsenic in the body . . . it is not stored," he stated.

Regarding the use of petroleum spray oils, Dr. Willard Machle, New York University, said that no tolerance is necessary in gasoline, kerosene or light oils, and heavy oils as used for agricultural insecticides create no hazard to the public health.

In behalf of Sharples Chemicals, Inc., Philadelphia, Dr. H. Brieger, Jefferson Medical College, Philadelphia reported on "endothol," sodium salt of 3, 6-endoxohexahydrophthalic acid. Only slight skin irritations were noted in animal tests, and one percent and 4% aqueous solutions brought light to moderate irritations to human skin. Dr. Davidow said that until further work is done, no opinion would be voiced as to the safe level of ingestion by man.

SUPPLY SITUATION

(*Continued from Page 35*)

1951 was more favorable prior to the Korean conflict. Natural pyrethrum

was essential to the military effort during the last war and with possible further military action in the southwest Pacific where malaria and similar insect-borne diseases are a problem, pyrethrum may again become a critical material for the military effort. However, there is now available a material which can basically supplement and substitute in some cases for natural pyrethrins, namely allethrin. Military and civilian requirements may be met, however, when one considers the stockpile of natural pyrethrum which is held by the Federal Government, plus the use of allethrin to extend these supplies, and the possibility of increasing imports of flowers. We are fortified further at this time by the availability of many synergists which can be used to extend supplies of both the synthetic and natural material.

Rotenone: Rotenone supplies have been available so far, but the Far Eastern source will probably continue to yield but very little quantities. Hence, we will have to rely for the most part, as we have during the past 7 or 8 years, on the materials which can be made available by the South American countries.

Other synthetic organic materials will depend entirely on what quantities of various raw materials can be made available for use in their production. Some of these newer materials require many organic intermediates which may have other urgent military requirements.

Copper, it is felt, can be made available for the necessary production of copper chemicals for fungicidal use. The price of copper will undoubtedly reflect itself in higher quotations for copper fungicides. At the present time, for example, copper sulphate is at about the highest figure it has been during the past 10 years.

There appear to be ample supplies of raw materials needed for the organic fungicides, but here again many of the raw materials that are required to make these materials may also find uses in more direct military requirements.

FUNGICIDES

(*Continued from Page 31*)

(2) Groves, A. B., Miller, H. J., and Taylor, C. F. Tri-state cherry spray investigations Penna. Agric. Exp. Sta. Bull. 447. 1943. Also in Va. Agric. Exp. Bull. 354. 1943, and West Va. Agric. Exp. Sta.

(3) Hilborn, M. T. and Lathrop, F. H. Organic fungicides in the control of apple scab and European red mite. Phytopath. 40: 12. 1950 (abstr.)

(4) Lewis, F. H. and Groves, A. B. Spraying sour cherries for disease affects size and quality of fruit. Penn. Agric. Exp. Bull. 464. (Suppl. 3) 6-7. 1945.

(5) McCallan, S. E. A. Factors influencing spray injury by glyoxalidine derivatives to potted apple trees. Contrib. Boyce Thompson Inst. 16: 21-26. 1950

(6) Thurston, H. W., Jr., Harry, John B., Lewis, F. H., Groves, A. B., and Taylor, C. F. Glyoxalidine derivatives as foliage fungicides, II. Field studies, Contrib. Boyce Thompson Inst. 14: 161-171. 1946.

(7) Wellman, R. H. and McCallan, S. E. A. Glyoxalidine derivatives as foliage fungicides, I. Laboratory studies, Contrib. Boyce Thompson Inst. 14: 151-160. 1946.

(8) Wentzler, W. E. and White, D. G. The effects of nitrogenous fungicides and insecticides on the chlorophyll content of apple leaves. Proc. Amer. Soc. Hort. Sci. 1950. (In press)

FERTILIZER PROGRESS

(*Continued from Page 39*)

usual practice is to granulate the complete mixed fertilizer to insure uniform distribution of all nutrients over the area to which the fertilizer is applied.

In addition to lengthening the period of availability of superphosphate, granulation imparts many other favorable qualities. The spheroidal, uniform particles are non-caking, dustless, and non-corrosive to farm implements. They flow freely and evenly through conventional drilling equipment. Uniformity of application has been found to increase fertilizer efficiency by as much as 50 per cent and increased yields from crops are, of course, attributed to greater fertilizer efficiency.

In a series of tests conducted by the New York Agricultural Experimental Station (1937), granulated and powdered fertilizers of the same formula (4-16-4) were compared for effectiveness in increasing tomato yields. The granular fertilizer particles ranged from 5 to 10 mesh, while the ground fertilizer was all through 40 mesh. In this particular test, in which the fertilizers were applied by broadcast, the yield of the crop treated with granular fertilizer was increased about 12% more than that of the crop treated with the powdered form, and about 40% more than the crop which received no fertilization. When these fertilizers were drilled, the same trend was true, although the increase in yield of the granulated over the powdered fertilizers was not as pronounced (8.6%). This was probably due to the fact that powdered fertilizers, drilled in concentrated bands, presented less exposed area to the soil than when applied by broadcast.

OFF-FLAVORS

(*Continued from Page 43*)

were handled statistically and it was demonstrated that only benzene hexachloride sprays regularly imparted off-flavors to Florida orange juices. A high gamma benzene hexachloride when used with oil apparently caused some off-flavor to oranges, but this material had no ill-effects when used without oil as a wettable powder. Chlordane, toxaphene, and parathion although used in dosages which were much higher than would ordinarily be used on citrus trees in Florida did not impart any off-flavors to the varieties upon which they were used. It is concluded that from the standpoint of off-flavor to juice, chlordane, toxaphene and parathion are safe to use on citrus in Florida; when fruit is present on the trees benzene hexachloride should not be used as a spray; and high gamma benzene hexachloride should be used as a wettable powder and not combined with oil for use when fruit is present on the trees.

Literature Cited

1. Wenzel, F. W. 1948. Canning and by-products research at the Citrus Experiment Station. Proc. Fla. St. Hort. Soc. 61:227-232.

New Lab for Stauffer

Stauffer Chemical Company has announced that construction of a new research & development laboratory at Dobbs Ferry, N. Y. will get under way at once. When completed, the building will house the research staff of the company's eastern division now scattered at several locations in and around New York City. Located next to Sawmill River Parkway, the building will be set in a landscaped area surrounded by lawns, shrubs and gardens. Five large laboratories for various research projects, administrative offices, technical library, work shop and storage and service areas are provided. All rooms and laboratories will be airconditioned and equipped with a wide variety of the most modern equipment.

Stauffer's Chauncey Plant, is located across the Parkway, will furnish facilities for pilot plant testing of products and processes developed at the new laboratory. The location permits the staff convenient access both to New York City's technical libraries and to Stauffer's general offices. John F. Crowther, Director of the firm's eastern research division, will be in charge.

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Weed Control in Peas

Since the presence of wild mustard in growing peas for canning decreases the yield and increases the labor of mowing and handling the plants, studies have been under way at the New York State Agricultural Experiment Station at Geneva for a satisfactory chemical control of weeds in peas, sweet corn and beets grown for processing. The summary of results reported in Bulletin No. 741, (By Curtis H. Dearborn) is as follows:

Selective weeding of peas was accomplished with a single spray applied when the peas were 4 to 8 inches tall. Water was used as the diluent for all sprays.

Chemicals that effectively controlled mustard in peas included sodium chloride, a mixture of sodium chloride and sodium nitrate, ammonium dinitro ortho secondary butyl phenate, and potassium cyanate. Finely powdered calcium cyanamid dispersed in dust form by airplane gave good control of mustard when weather conditions were favorable for its use. With either the dinitro compounds or cyanamid dust, the peas showed the effects of the chemical burn for about a week. Potassium cyanate caused a distinct yellowing of the peas which was also considered as a spray burn. At the concentration of chemicals used in these studies, growers need not be alarmed about the wilting or discoloration of pea foliage. Weed-free peas recovered rapidly. Peas were seriously damaged only where the pattern of the spray boom overlapped areas that had been sprayed previously. Peas showed no burning where the sprays of sodium chloride and sodium nitrate were used. Likewise, lamb's quarters was not injured by these two chemicals and could be a real problem following the use of these salt sprays.

2,4-D for weeding peas is still in the experimental stage but warrants further field testing.

Sweet corn has shown a rather high tolerance to a complete cover spray of 2,4-D. Conversely, broadleaved weeds common in sweet corn fields were killed by concentrations of 2,4-D that produced a visible effect only temporarily in the early growth of the sweet corn. Postemergence sprays of 2,4-D used at concentrations within the safe range for Golden Cross Bantam sweet corn did not satisfactorily control annual grasses; therefore, cultivation was essential in fields where annual grasses were abundant.

The weeding of sweet corn was satisfactorily accomplished except for grasses with the equivalent of ¾ pound of 2,4-D acid to the acre applied when the corn was breaking ground or up until the corn was 6 to 8 inches tall. When it was impossible to spray corn during this period, the same rate of 2,4-D per acre was used with equal success in killing the

weeds providing the spray nozzles were carried high enough to cover the terminal growth of the sensitive weeds. More visible crop response in the form of leaf rolling was observed with the later applications particularly where the ester forms of 2,4-D were used. Sprays of 2,4-D applied in conjunction with cultivation but following the stirring of the soil inhibited weed growth longer than the same concentration applied and mixed with the soil directly by the cultivator teeth. No evidence was gathered during the very dry season of 1949 to indicate that the growth of corn was modified more by 2,4-D where it had been applied to the soil and left undisturbed for the remainder of the season than where it was cultivated in directly after spraying.

Beets in the seedling stage present quite a different problem in weeding than do peas and sweet corn. The mass of the seedling beet is small as compared with seedling pea and corn plants. The leaf is broad and tends to funnel the spray materials toward the growing point. Beets were selectively weeded with sprays of sodium chloride and sodium chloride plus sodium nitrate; however, lamb's quarters and purslane remained uninjured. This was an undesirable situation which limited the use of these sprays.

The completeness with which sensitive weeds, including very young grasses, were killed by salt sprays applied at 20 to 30 pounds pressure has made it seem doubtful if higher pressures are necessary. Where spraying was delayed and the weeds were 8 to 10 inches tall, higher spray pressures gave better coverage of the small weeds that were normally shielded by the larger weeds. Stand and yield of beets was not affected by the salt sprays providing they were applied after the beets had developed two true leaves.

Industry Patents

2,511,784. Compositions containing 2,4-dichlorophenoxyacetic acid and process for the preparation thereof. Patent issued June 13, 1950, to Grady M. O'Neal, Chicago, Ill. The method of preparing 2,4-dichlorophenoxyacetic acid which comprises essentially passing chlorine gas into molten phenol at a temperature above the melting point of the phenol until the phenol is principally dichlorinated, condensing the resultant mixture with mono-chloroacetic acid under alkaline conditions and acidifying the resultant reaction mixture, the quantity of chlorine and of mono-chloroacetic acid being effective to produce a condensation reaction product in said reaction mixture comprising essentially at least 84% by weight of 2,4-dichlorophenoxyacetic acid and a minor proportion of 2,6-dichlorophenoxyacetic acid, 2-chlorophenoxyacetic acid, 4-chlorophenoxyacetic acid and 2,4,6-trichlorophenoxyacetic acid, treating said reaction mixture with water during said acidification, isolatng the insoluble part of said reaction mixture from the soluble part thereof, further treating the isolated part with water, the quantity of water added to the reaction mixture during said acidification and afterward to said isolated part being sufficient to dissolve substantially all of the 2,6-dichloro-, the 2-chloro-, and the 2,4,6-trichlorophenoxyacetic acids, and separating the resultant aqueous solution of chlorophenoxyacetic acids from the residual isolated undissolved part of the reaction mixture.

2,513,675. Insect repellent mixtures comprising a hydrogenated diphenyl and a hydrogenated naphthol. Patent issued June 27, to Michel Pijoan and Leo A. Jachowski, Jr., U. S. Navy. An insect repellent mixture comprising essentially a predetermined quantity of a hydrogenated naphthol having at least one ring saturated with hydrogen and a preponderant amount of a hydrogenated diphenyl having at least one ring saturated with hydrogen.

2,513,018. Nitrodithioacetates as Fungicides. Patent issued June 27, 1950, to Everett G. Gilbert, New York, assignor to Allied Chemical & Dye Corp, New York. A funcicidal composition comprising a carrier having associated therewith a heavy metal salt of a compound having the formula

wherein R is a member of the group consisting of hydrogen and the methyl group and R' is a member of the group consisting of hydrogen, the methyl and ethyl groups, said compound containing not over four carbon atoms.

2,513,503. Adjustable Nozzle. Patent issued July 4, to E. J. Marshall, Cambridge, England, assignor to Pest Control, Ltd., Harston, England. An adjustable whirling spray nozzle comprising an internally forwardly tapered nozzle piece, an outlet orifice at the forward end of said nozzle piece, a closure plate at the rear end of said nozzle piece, a plurality of rearwardly enlarged apertures in said closure plate spaced from the axis of said nozzle, a supporting plate spaced axially from said closure plate, a like number of forwardly enlarged apertures in said supporting plate spaced from the axis of said nozzle, a like number of jet members associated with the two said plates, the said jet members having rounded forward ends seating in said apertures in said closure plate and rounded rear ends seating in said apertures in said supporting plate, said closure plate being mounted for rotation relative to said supporting plate about the axis of said nozzle to vary the inclination of said jet members, and said closure plate and said supporting plate being mounted for axial movement relative to one another to vary the distance between the two said plates as the inclination of the said jet members varies.

2,513,810. Fertilizer Spreader. Patent issued July 4, to E. L. Masters, Benton Harbor, Mich. In a fertilizer spreader, a bin with converging walls terminating in a bottom, said bottom having a series of feed holes, an angular metering plate in the bottom of said bin having a flange with a series of apertures slidable over the bottom of the bin and a guide flange slidable along one side wall of the bin, last mentioned side wall having an opening, an actuating lever extending through and fulcrumed in said opening, means on said guide flange for removably connecting the lower end of said lever thereto and means for latching said lever in any adjusted position.

2,514,150. Insecticides produced by reacting trialkyl phosphates with triophosphoryl halides and their preparation. Patent issued July 4, to Alan Bell, Kingsport, Tenn., assignor to Eastman Kodak Co., Rochester, N. Y. A process for preparing compounds having insecticidal properties which comprise heating a trialkyl orthophosphate with a liquid thiophosphoryl halide whereby the alkyl halide formed is driven off and a tridialkyl phospho triophosphate is obtained.

2,514,621. Insecticidal compositions comprising either hexyl alkyl tetraphosphate or tetra-alkyl pyrophosphate and either an alkali-metal fluoride or fluorosilicate. Patent issued July 11, to Alan Bell, Kingsport, Tenn., assignor to Eastman Kodak Co., Rochester, N. Y. An improved phosphorus-containing insecticide having increased longevity and containing as essential ingredients a phosphate compound from the group consisting of hexa alkyl tetra phosphates and tetra alkyl pyrophosphates, the alkyl being of less than four carbon atoms together with a small content of a water-soluble fluorine-containing compound from the group consisting of fluorides and fluorosilicates of the alkali metals, said small content being sufficient when in cooperative relation with said phosphates to impart the increased longevity, but insufficient when said fluorine-containing compound is considered alone to account for the changed toxicity of said insecticide.

2,514,714. Insecticidal composition contaning a resinous clay tower polymer. Patent issued July 11, to Edwin G. Marhofer, Bartlesville, Okla., assignor to Phillips Petroleum Co. An insectfide composition comprising an effective quantity of a contact insecticide and a resin, derived from the polymeric residues obtained from the clay tower treatment of gasoline, selected from the group consisting of those resins having a solids content of 60 to 70 weight per cent, an A. P. I. gravity of 15 to 20 and a Gardner-Holdt viscosity of B to H, and those resins having a softening point between 140 and 160° F. and an iodine number between 2200 and 250.

Trade Mark Applications

JIM FARMWELL'S, in hand-lettered caps and lower case, for weed killer. Filed Aug. 22, 1949, by Osborne-McMillan Elevator Co., Minneapolis, Minn. Claims use since May 1, 1946.

REMARCO, in hand-lettered style, with most of word enclosed within oval line, for agricultural insecticide and fungicide for use as plant and garden spray; a spray for greenhouse use; and as a cattle spray. Filed Sept. 26, 1949, by Re-Mark Chemical Co., Inc., Miami, Fla. Claims use since June 25, 1949.

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"Rax" Literature Just Out

Literature on Warfarin rodenticides under the trade name "Rax Powder" is available from R. J. Prentiss Co., 110 William St., New York. Two new brochures, one a 12 page booklet and the other a 4-page accordian-folder, describe fully the material and its proper use.

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New P. C. Borax Address

Pacific Coast Borax Co. has announced a new address for its New York office, at 100 Park Avenue, New York 17. The move was made from the firm's former Madison Ave. address as of June 30.

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.

Positions Wanted:

Sales Representation: Do you want to sell the chemical, chemical specialty, agricultural chemical, soap, detergent, and allied industries in New York Metropolitan territory? Man with 15 years sales experience this area knows the buyers, best references, good sales record, available for new connection. Could do excellent job for out-of-town manufacturer in N. Y. territory where experience and contacts would be valuable. For further details write Box No. 462, care of Agricultural Chemicals.

Masters Degree. Strong background in agricultural chemistry and related sciences. Desire position with a future. References, Address Box No. 463, care of Agriculture Chemicals.

Agricultural Chemist-Agronomist. Research and production in fine chemicals, insecticides and fungicides, teaching experience. Now employed. 20 credits toward Master's degree. Desire position with progressive organization. Location immaterial. Address Box No. 464, care of Agricultural Chemicals.

Fertilizer Salesman for recent agronomy graduate. Have had summer experience on farms. Also interested in other work closely related to the field of agronomy. Address Box No. 465, care of Agricultural Chemicals.

Plant Pathologist: With training in screening of organic compounds as fungicides, etc. Field experience in crop disease control and herbicides. Extension experience. Speak Spanish. No objection Latin American location. Address Box No. 466, care of Agricultural Chemicals.

Positions Wanted:

Decentralizing? Expanding? Seeking more desirable locality? Watertown, South Dakota is the proper place and is anxious to serve you. Write, wire or phone Mayor Gilbert or City Promotional Director.

FERTILIZER MEET

(Continued from Page 75)

Farm Research Association, will discuss the best placement of fertilizer for corn, and D. R. Dodd, Ohio State University, Columbus, will describe the most promising methods of application of fertilizers to pastures.

The afternoon session will feature eight speakers, according to the advance program. These will include talks by C. H. Mahoney, National Canners' Association and J. D. Barnard, Minnesota Valley Canning Co. on principles involved in the placement of fertilizers to truck crops; Proctor W. Gull, Spencer Chemical Co., Kansas City, Mo., on the advantages, limitations and present status in the use of liquid and gaseous fertilizers; and Malcolm H. McVickar, National Fertilizer Association, Washington, will discuss the application of fertilizers by airplane.

Maurice H. Lockwood, International Minerals & Chemical Corp., Chicago, will talk on the problems of fertilizer manufacturer.

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$30,000 Awarded HR-323

The House of Representatives has appropriated $30,000 for the carrying out of provisions of House Resolution 323, known as the Sabath Resolution to investigate the use of pesticides in agriculture. This appropriation is understood to provide operating funds for the seven man committee until January 1, at which time a further appropriation is expected.

Nat'l Shade Tree Meeting

Nearly 500 persons attended the twenty-sixth National Shade Tree Conference held at the Hotel Syracuse, Syracuse, N. Y., August 21-25.

The program included talks on chemicals used for the control of tree diseases and insects, and also of chemical weed killers.

Homer L. Jacobs, Davey Tree Expert Co., Kent, Ohio, discussed 2,4-D in a talk entitled, "2,4-D, Friend or Foe?" He pointed out that the herbicide is an effective weapon, but is to be used only with good judgment. More and more use of it is being made by tree expert companies, he said, but emphasized again that the user must be completely acquainted with the material.

Norman Armstrong, White Plains, N. Y. described the latest spraying practices, pointing out the necessity of full coverage with whatever type of applicator is being used. Tree diseases were discussed by several speakers, including Dr. Curtis May, and Dr. D. E. Parker, U.S. D.A., Beltsville, Md.; Prof. James E. Kuntz, University of Wisconsin, Madison, and Dr. J. C. Carter, University of Illinois, Urbana. Dr. May's subject was Dutch Elm Disease and Phloem Necrosis; Prof. Kuntz spoke on Oak Wilt, and Dr. Carter described Cystospora Canker.

The final day of the conference included a plant clinic under the leadership of Dr. A. M. S. Pridham, Cornell University; a talk on Red Mite Control by Dr. J. G. Mathysse, Cornell; and a symposium, led by Dr. D. S. Welch, also of Cornell, on pest control in shade trees.

Roy R. Hirt, president of the Conference, presided at all meetings. Meeting concurrently with the Shade Tree Group, was the National Arborist Association.

Officers elected at the meeting were announced as follows: president, E. W. Higgins, Frost & Higgins Co., Boston, Mass.; vice-president, Noel Wysong, Forest Reserve District, Riverforest, Ill.; secretary-treasurer, (re-elected) L. C. Chadwick, Columbus, Ohio. Paul E. Tilford, Wooster, Ohio, remains editor.

Advertisers' Index

SEPTEMBER, 1950

(The Advertisers' Index has been checked carefully but no responsibility can be assumed for any omission)

TALE ENDS

IT'S meeting time again! Members of the industry will be packing their bags soon for the imminent conventions of the A.A.E.E.: the A.P.S. (Phytopaths); divisions of the American Chemical Society; the four Associations of Control Officials; a Fertilizer meeting (NFA); the weed control conferences and the myriad of state and local gatherings which continue throughout the winter. Although such a schedule puts a strain on those who try either to attend or keep track of each organization, the information derived from these gatherings makes them greatly worth while. Time out while the writer gets his *own* bag packed! We'll be seeing you!

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To make it easy for persons in the trade to subscribe to *Agricultural Chemicals*, business reply cards are placed in the hands of such people so they may fill in the blanks and enter their subscriptions without much writing. Occasionally, however, we receive unsigned cards. The latest of these was received, *sans* name or address, from Hazardville, Conn. If someone would tell who this anonymous prospective reader is, we'll be happy to enter his subscription!

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Once or twice before, we've heard of living "weed killers" being used, but here is another. Strawberry farmers near Geneva, New York, have discovered that geese turned loose in strawberry patches systematically eat the weeds but ignore the berry plants. This rather strange choice reduces the weed-pulling formerly done by women and children.

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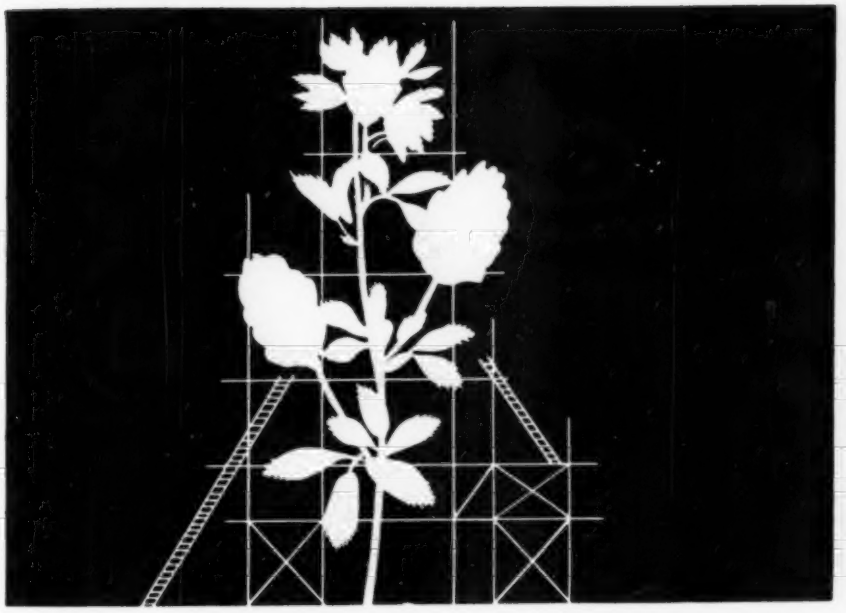
To put an official slant on the pasture fertilization program which has gone over so well in some of the States, the USDA is reported to be considering the launching of such a program on a national scale, in 1951. That pasture fertilization is a paying proposition has been proved on countless farms where the program has operated.



AMMONIA NITROGEN builds COVER CROPS

Grasses, clovers, and legumes—whatever the cover crop—ammonia nitrogen means rapid, early growth. By building vigorous cover, it helps hold the land down to earth, fights erosion, and cuts down the annual harvest of dust bowls.

High-nitrogen fertilizer, applied to cover crops, is an important part of the soil conservation program.

CSC produces anhydrous ammonia, the most concentrated and economical source of nitrogen, at its Sterlington, Louisiana, plant. The major part of this production is going to Gulf Coast manufacturers for conversion to high-nitrogen fertilizers.

PRODUCTS OF THE AGRICULTURAL DIVISION
Anhydrous Ammonia • Benzene Hexachloride • Choline Chloride • Condensed Distillers' Molasses Solubles • Dilan • Ethyl Formate • Metaldehyde • Niacin • Butyl Fermentation Solubles and Riboflavin Feed Ingredients

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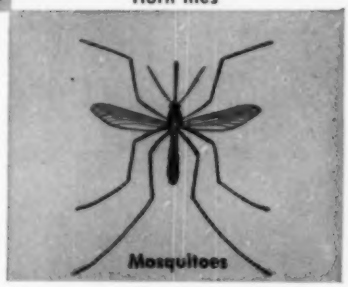

Mosquitoes

WHICH DAIRY INSECTICIDES Kill 'em All YET WON'T CONTAMINATE MILK?

Answer: *Pyrenone-based insecticides*. They're the only insecticides that protect cattle against all the pests shown here. They will not contaminate milk or meat . . . are free from skin irritants and unpleasant odors.

Give *your* dairy insecticides these sale "pluses." Base them on Pyrenones and cash in on the hard-selling nationwide advertising, publicity, and promotion campaigns that are keeping Pyrenone-based insecticides *first* in the minds of *your* customer – the dairy farmer.

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